Report

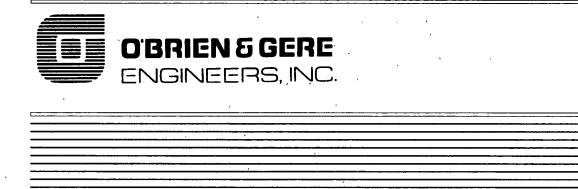


Post-Construction Baseline Ground Water Sampling Event

Superfund	Records Center
SITE:	Sell, van J
BREAK:	8.4
OTHER:	558843

Sullivan's Ledge Superfund Site New Bedford, Massachusetts

April 2000





April 11, 2000

Mr. David O. Lederer Remedial Project Manager Environmental Protection Agency (HBO) Region 1 1 Congress Street, Suite 1100 Boston, MA 02114-2023

Re: Sullivan's Ledge Superfund Site

Baseline Groundwater Monitoring

File: 5509.005

Dear Dave:

Please find enclosed for your review the Post Construction Baseline Groundwater Monitoring Report.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC

James M. O'Loughlin, PE Managing Engineer

Enclosure

cc: S. Wood

D. Buckley

J. Heckathorne

E. Bertaut

D. Dwight

G. Swenson

R. Connors



Report

Post-Construction Baseline Ground Water Sampling Event

Sullivan's Ledge Superfund Site New Bedford, Massachusetts

James M. O'Loughlin, P.E. Managing Engineer

April 2000



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1. Introduction

1.1. Purpose and Objectives

Consistent with discussions with the United States Environmental Protection Agency (USEPA) in 1994 and procedures outlined in the Post-Construction Environmental Monitoring Plan, O'Brien & Gere Engineers, Inc. (O'Brien & Gere) conducted a baseline round of ground water monitoring from November 1999 to January 2000. This round was timed to coincide with the start-up of the Ground Water Treatment Plant (GWTP) in the winter of 1999-2000. Sampling was conducted in accordance with the Final Field Sampling Plan (FSP) submitted to Metcalf & Eddy (M&E) in January 2000 (Appendix A). The initial draft of the FSP was submitted to M&E on July 26, 1999. M&E provided a subsequent round of comments on August 24, 1999. O'Brien & Gere addressed these comments in a letter dated September 17, 1999.

1.2. Deviations from Field Sampling Plan (FSP)

The following deviations from the FSP were made during the baseline sampling event:

- Monitoring wells MW-10, MW-10A, and MW-10B were not sampled due to the presence of approximately two feet of water surrounding the well cluster. Access to these wells could not be safely attained. In addition, there was a concern that the presence of standing water could impact the integrity of the water samples to be collected.
- Monitoring wells MW-12, MW-17, and ECJ-3 were not sampled due to integrity issues as discussed in Section 2.1.
- Finally, the quantity of water sampled from Westbay wells ECJ-2 and ECJ-4 was decreased by two liters to more efficiently complete the sampling event. For these two wells, 300 mL was submitted to the laboratory for filtered and unfiltered metals analyses. Also, one liter of ground water was submitted to the laboratory for Polychlorinated Biphenyls (PCBs) and Semi-volatile Organic Compounds (SVOCs) analyses. Samples collected from the remaining Westbay wells were successfully analyzed for the parameters stated in the FSP.

Post-Construction Baseline Ground Water Sampling Event	
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2. Summary of field activities

2.1. Well locations

The location of overburden, shallow bedrock, intermediate bedrock, and deep bedrock monitoring wells and Westbay ports are shown on Figures 1, 2, 3, and 4, respectively.

2.2. Quantitative well integrity testing

In accordance with Section 2.3 of the FSP, O'Brien & Gere conducted a series of qualitative well integrity tests prior to ground water sampling, as shown in Appendix B. The purpose of the qualitative well integrity testing was to identify monitoring wells which would require repair prior to monitoring. Testing proceeded from the less contaminated wells to the more highly contaminated wells, based on historical ground water quality at the Site.

Initially, the depths to water were collected using a Solinst® electronic measuring tape accurate to the nearest 0.01 ft. A "plunker," as described in the FSP, was then used to determine the depth of the wells. Readings were taken from PVC and the metal casing at each well location. In addition, the heights of the metal stick-ups were recorded to determine if the well casings or riser pipes had shifted during cap construction activities. A summary of measurements taken during the qualitative well integrity testing is provided in Appendix B of this report.

As a result of performing the qualitative well integrity testing, obstructions in some wells and the presence free phase product in one well were identified which prevented depth to water and well measurements to be taken. As a result, several wells were not sampled during this baseline monitoring event, as described below:

- Monitoring well MW-12 was not sampled during this sampling event due to the discovery of tubing in the well. This tubing could not be removed at the time of sampling, and no analysis was completed at this location.
- Upon performing the well integrity testing at the Site, product was found in monitoring well MW-17. As a result, no ground water samples were collected from this location for analysis.

 Westbay well ECJ-3 was not sampled during this sampling event due to the presence of an obstruction (i.e., soil) inside the well at a depth of a thirty-three feet below grade (fbg). No water was observed in the well at this depth, and the Westbay probe was unable to dislodge the obstruction.

2.3. Water levels

Water level measurements taken from the top of the casing are provided in Appendix B. Ground water contour maps have not been included with this report, since a top of casing survey has not been completed.

2.4. Conventional ground water monitoring wells

Following completion of the qualitative well integrity testing, a total of twenty conventional ground water monitoring wells were identified, characterized, and sampled in accordance with the FSP and the QAPP through the use of an EPA-approved low-flow bladder pump system dedicated to each well.

Prior to sampling, purged ground water was characterized and tested in a flow-through cell on-site for the parameters described in Section 2.5 of the FSP. Equipment used to perform the characterization was calibrated and used in accordance with the standards and protocols provided in Section 3.6 of the QAPP. Ms. Laurie Osowski of Metcalf & Eddy observed characterization and sampling procedures on November 11 and November 17, 1999. Calibration certifications and metals filtering issues were discussed during these two site visits.

Following characterization, sampling of the conventional wells was completed using procedures described in Section 2.6 of the FSP. Sampling logs are provided in Appendix C of this report.

Samples were packed on ice and sent to O'Brien & Gere Laboratories, Inc. under a chain-of-custody (COC) for VOCs, SVOCs, PCBs, and selected metals analyses by methods described in Section 2.1 of the FSP. Temperature and trip blanks were shipped with each cooler submitted to the laboratory in accordance with Section 3.5 of the QAPP.

Quality Assurance/Quality Control (QA/QC) samples were also collected in accordance with Section 3.5 of the QAPP, which included two duplicate samples, a matrix spike (MS), and a matrix spike duplicate (MSD). Duplicate samples #1 and #2 were collected at MW-14 and MW-5, respectively. Additionally, a MS/MSD sample was collected at MW-5A.

2.5. Westbay monitoring wells

In addition to the sampling performed on the twenty conventional ground water monitoring wells, three Westbay bedrock wells (ECJ-1, ECJ-2, and ECJ-4) were also sampled as part of this baseline ground water sampling event. Westbay wells were constructed in such a manner that several discrete sampling ports provide independent ground water samples. Sampling ports were selected for each well and are summarized in the Westbay field sampling logs provided in Appendix D. Consistent with Section 2.6 of the FSP, ground water from these Westbay ports was directly sampled without characterization.

Samples collected from the Westbay bedrock wells were packed on ice and shipped under a COC to O'Brien & Gere Laboratories, Inc. for VOC, SVOCs, PCBs, and selected metals analyses in accordance with the procedures outlined in Section 2.1 of the FSP. Temperature and trip blanks were shipped with each cooler submitted to the laboratory in accordance with Section 3.5 of the QAPP.

QA/QC samples from the Westbay sampling were also collected which included a single duplicate and one MS/MSD sample. The duplicate sample was collected at ECJ-1 (62'), and the MS/MSD sample was taken at ECJ-1 (37').

2.6. Results

Validated data from each sampling round is provided in Appendix E. In addition, a data validation report is provided in Appendix F. The baseline data has been downloaded into a Microsoft FoxPro relational database management system (DBMS) to facilitate future data management and trend analysis.

2.7. Qualitative comparison to historical data

A qualitative comparison of historical data to data from this baseline ground water sampling event has been conducted to confirm basic design assumptions, using the representative wells and parameters identified in the 1995 "Design Phase Groundwater Monitoring Report." The results of the qualitative comparison to historical data are provided on Tables 1-5.

VOCs

Table 1 shows historical concentrations of VOCs in wells MW-6A, MW-13A, MW-22A, MW-12, GCA-1, ECJ-1 (72 ft), ECJ-1 (122 ft), and ECJ-2 (82 ft). With respect to VOC data, no significant differences were noted between the historical data and the baseline data, from the perspective of ground water treatability. Some possible trends were noted, however, primarily in the overburden and shallow bedrock wells, on and adjacent to the site, as discussed below:

- MW-6A: Possible trend of increasing concentrations of 1,2 DCE and vinyl chloride.
- MW-13A: General long-term trend of decreasing concentrations of all constituents.
- MW-22A: First consistent detection of benzene, toluene, ethylbenzene, and xylene since 1988.
- MW-12: General trend of decreasing concentrations of most constituents.
- GCA-1: Concentrations of constituents detected in 1999 were higher than those detected during pre-design (1992-1993, 1995), but not necessarily higher than those detected during the 1980s.

It should be noted that significant subsurface construction occurred in the immediate vicinity of these wells during the 1998 construction season, and that dewatering efforts have been underway from the shallow-collection trench at manhole #4 and from the pump station since February 1999. It is not surprising that the concentrations of certain constituents have varied since 1995, when the last round of ground water sampling was conducted. Given that construction impacts could account for some slight variation, sample results are generally consistent with the design phase data.

With respect to the deeper wells, Westbay well ports ECJ-2 (72 ft), ECJ-1 (122 ft), and ECJ-2 (82 ft) do not appear to be showing significant long term trends, with the possible exception of decreasing concentrations of TCE in ECJ-1 (122 ft) and ECJ-2 (82 ft).

MW-12A, MW-13A, and MW-22A were used to characterize the concentrations of VOCs in shallow ground water for purposes of remedial design. Table 2 compares the baseline data to historical concentrations. As shown on Table 2, no significant trends from a ground water treatability perspective were observed.

Recovery wells BEI-1, BEI-2, and BEI-3 were sampled during the 1992 pump test and during the 1995 sampling round. Although not required to be sampled during this baseline round of ground water sampling, these recovery wells were sampled on December 29, 1999 and January 27, 2000 as part of the Ground Water Treatment Plant (GWTP) start-up. Table 3 compares the baseline ground water monitoring data to the historical results. As shown on Table 3, no significant trends from a ground water treatability perspective were observed.

PCBs

Table 4 shows historical concentrations of PCBs in MW-6A and MW-22A. The recent PCBs analysis suggests a possible decreasing trend in concentrations for Aroclor-1260 and Aroclor-1254 compounds for these two monitoring wells. However, total PCB concentrations are consistent with those observed during other rounds.

SVOCs

Consistent with the conclusions in the Ground Water Trend Analysis Report (O'Brien & Gere Engineers, Inc., 1993), as shown in Table 5, the relative concentrations of SVOCs continues to be low when compared to total VOCs.

Metals

Because samples from previous rounds were previously collected by bailer, versus the low flow sampling conducted in 1999/2000, a qualitative historical comparison for metals was not conducted.



3. Summary, conclusions, and recommendations

A total of twenty conventional wells and seventeen ports from Westbay wells were sampled and analyzed for VOCs, SVOCs, PCBs, and RCRA-8 metals to baseline ground water quality prior to operation of the GWTP. Several wells (i.e., MW-10, MW-10A, and MW-10B) could not be sampled due to access issues, and several additional wells (i.e., MW-12, MW-17, and ECJ-3) could not be sampled due to obstructions or the presence of oil. Analytical results were validated and downloaded into a Microsoft FoxPro relational database management system to facilitate future data management and trend analysis. Sample results from select wells deemed to be representative of ground water quality to the GWTP were also compared to historical results.

Based on the work completed, the following conclusions are presented:

- From the perspective of ground water treatability, no significant differences were noted between the baseline results and historical results.
- Some possible trends in VOC concentrations (both increasing and decreasing) were noted in certain overburden and shallow bedrock wells on and adjacent to the Disposal Area.
- Significant trends were generally not observed in intermediate and deep bedrock wells in and adjacent to the Disposal Area, with the possible exception of decreasing concentrations of TCE.
- Relative concentrations of SVOCs continue to be low when compared to total VOCs.

Based on the work conducted, the following recommendations are made:

- Access and integrity issues associated with wells MW-10, MW-10A, MW-10B, MW-12, MW-17, and ECJ-3 should be addressed.
- A focussed sampling and analysis program should be developed to provide data that is useful to both Ground Water Treatment Plant operations and also monitoring of the management of migration.

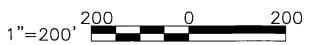
Post-Construction Baseline Ground Water Sampling Event	

FIGURE 1



SULLIVAN'S LEDGE SUPERFUND SITE NEW BEDFORD, MASS.

OVERBURDEN WELL LOCATION MAP



FILE NO. 5509.005-002 MARCH 2000



FIGURE 2



SULLIVAN'S LEDGE SUPERFUND SITE NEW BEDFORD, MASS.

SHALLOW BEDROCK WELL LOCATION MAP



FILE NO. 5509.005-003 MARCH 2000





SULLIVAN'S LEDGE SUPERFUND SITE NEW BEDFORD, MASS.

INTERMEDIATE BEDROCK WELL LOCATION MAP



FILE NO. 5509.005-004 MARCH 2000



TABLE 1

SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND PDWP GROUND WATER DATA

VOLATILE ORGANICS GROUP 2: INTERMEDIATE BEDROCK WELLS

WELLINUMBER	EGJ-1	EGUA	ECJ-1	ECJ-1	ECJ-1	ECJ-1	ECJ-1.
DEPTH COMPOUND.	122 15 MAR 88	122 20 AUG 92	9 DEC 92	+ 122' 10 FEB 93	122' 3 MAY 93	122' 23 MAR 95	122'
1,1,1-Trichloroethane	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
1,1,2,2-Tetrachloroethane	Ü	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
1,1,2-Trichloroethane	Ü	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
1,1-Dichloroethane	Ü	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
1,1-Dichloroethene	Ü	2000 UJ	260 J	5000 UJ	10000 U	10000 U	170 J
1,2-Dichloroethane	Ü	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	11
1,2-Dichloroethene (total)	12000	22000 J	110000 J	130000 J	150000 J	140000	62320 J
1,2-Dichloropropane	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	02320 U
2-Butanone	Ü	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	10 U
2-Hexanone	Ü	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	5.0 U
4-Methyl-2-Pentanone	Ū	2000 UJ	1700 J	5000 UJ	10000 U	10000 U	5.0 U
Acetone	Ŭ	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	10 U
Benzene	Ü	2000 UJ	5000 UJ	5000 UJ	440 J	10000 U	150 J
Bromodichloromethane	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Bromoform	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Bromomethane	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	1.0 U
Carbon Disulfide	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0 50 U
Carbon Tetrachloride	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0 50 U
Chlorobenzene	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	26
Chloroethane	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	1.0 UJ
Chloroform	U	2000 UJ	5000 UJ	5000 UJ	10000 ป	10000 U	0.50 U
Chloromethane	υ	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	10 U
cis-1,3-Dichloropropene	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Dibromochloromethane	υ	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Ethylbezene	υ	2000 UJ	3300 J	4000 J	10000 U	3900 J	2000
Methylene Chloride	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	2.0 U
Styrene	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.91
Tetrachloroethene	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Toluene	U	2000 UJ	2400 J	2900 J	10000 U	3100 J	1100
trans-1,3-Dichloropropene	U	2000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Trichloroethene	74000	5300 J	29000 J	5000 UJ	690 J	10000 U	11
Vinyl Chloride	υ	2000 UJ	2100 J	4700 J	6600 J	13000	6100
Xylene (total)	U	180 J	96 J	5000 UJ	10000 U	10000 U	46
Units: ug/L							

U = non-detected

J = estimated

r

SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND PDWP GROUND WATER DATA

VOLATILE ORGANICS GROUP 2: INTERMEDIATE BEDROCK WELLS

WELL NUMBER	EGJ:2FC	ECJ-2	ECJ-2=1	EGJ-2	FECURE	ECJ/2	=;	ECJ-2
DEPTH COMPOUND	82 3 MAR 88	82 3 MAR 88	82' - 31'AUG 92	82 7 DEC 92	82° 12 FEB 93°	7 MAY 93	82 24 MAR 95	82 3 IAN 00
1.1.1-Trichloroethane	U	U	1000 U	1000 UJ	2000 U	1200 U		120 U
1,1,2,2-Tetrachloroethane	Ŭ	Ü	1000 U	1000 UJ	2000 U	· 1200 U		120 U
1,1,2-Trichloroethane	l ũ	Ū	1000 U		2000 U	1200 U		120 U
1.1-Dichloroethane	l ŭ	5	1000 U		2000 U	1200 U		120 U
1.1-Dichloroethene	42	53	1000 U		2000 U	49 J	5000 U	120 U
1,2-Dichloroethane	U	8	1000 U		2000 U	1200 U		120 U
1,2-Dichloroethene (total)	10000 J	13000 J	7900	24000 J	21000	27000	51000	922 J
1,2-Dichloropropane	U	U	1000 U	1000 UJ	2000 U	1200 U		120 U
2-Butanone	Ū	Ū	1000 U	1000 UJ	2000 U	1200 U		2500 U
2-Hexanone	Ú	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	1200 U
4-Methyl-2-Pentanone	1000	3200	1000 U	2100 J	2000 U	2300	5000 U	1200 U
Acetone	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	2500 U
Benzene	60	77	1000 U	85 J	2000 U	· 190 J	5000 U	80 J
Bromodichloromethane	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	120 U
Bromoform	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	120 U
Bromomethane	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	250 U
Carbon Disulfide	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	120 U
Carbon Tetrachloride	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	120 U
Chlorobenzene	17	22	1000 U	4 J	2000 U	1200 U	5000 U	120 U
Chloroethane	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	250 UJ
Chloroform	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	120 U
Chloromethane	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	250 U
cis-1,3-Dichloropropene	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	120 U
Dibromochloromethane	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	120 U
Ethylbezene	270	410	570 J	990 J	960 J	660 J		1000 U
Methylene Chloride	U	U	1000 U	1000 UJ	2000 U	1200 U	5000 U	500 U
Styrene	220	320	1000 U	1000 UJ	2000 U	1200 U	5000 U	120 U
Tetrachloroethene	14	16	1000 U	1000 UJ	2000 U	1200 U		120 U
Toluene	580	900	1000 U	1400 J	1500 J	1200 U		940
trans-1,3-Dichloropropen	U		1000 U	1000 UJ	2000 U	1200 U	5000 U	120 U
Trichloroethene	9500	14000	1000 U	12000 J	15000	9000	4500 J	120 U
Vinyl Chloride	560	1000	11000	3600 J	2000 U	5800	13000 J	14000
Xylene (total)	12	14	660 J	1000 UJ	2000 U	1200 U	5000 U	120 U
Units: ua/L	· · ·							

Units: ug/L

U = non-detected

TABLE 1

SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND PDWP GROUND WATER DATA

VOLATILE ORGANICS GROUP 3: SHALLOW BEDROCK WELLS

WELL NUMBER	WW-12	MW-12	MW-12	MVV-12	MW-12	MVV-12	MW-12	M/V-12	MW-12	MW-12
DERTH COMPOUND										
1,1,1-Trichloroethane	17 JAN 85	17 JAN 85	13 MAR 86		20 AUG 92	2 DEC 92	11 FEB 93		22 MAR 95	18 NOV 99
1,1,2,2-Tetrachloroethane	ا س	U	U	150	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
	540	U	U	U		500 U	500 U	500 U	1000 U	1.0 U
1,1,2-Trichloroethane	<u>'</u>	U	U	υ	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
1,1-Dichloroethane	!	U	U	7	200 UJ	500 U	500 U	500 U	1000 U	0.40 J
1,1-Dichloroethene		U	U	87	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
1,2-Dichloroethane	} U	U	U	U	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
1,2-Dichloroethene (total)	120	130	2900	30000	2300 J	6100	15000 J	8000	13000	2.0 U
1,2-Dichloropropane	ا [.] ا	U	U	U	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
2-Butanone	미	U	U	U	200 UJ	500 U	500 U	500 U	1000 U	20 U
2-Hexanone	· u	U	U	U	200 UJ	500 U	500 U	500 U	1000 U	10 U
4-Methyl-2-Pentanone	170 J	380	U	U	200 UJ	500 U	500 UJ	500 U	1000 U	10 U
Acetone	U	U	U	U	540 J	500 U	500 U	500 U	1000 U	20 U
Benzene	540	600	300	340 J	150 J	99 J	390 J	270 J	320 J	61
Bromodichloromethane	υ	U	u	U	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
Bromoform	u	U	l u	U	200 UJ	500 U	⊪ 500 U	500 U	1000 U	1.0 U
Bromomethane	U	u	u	U	200 UJ	500 Ū	500 U	500 U	1000 U	2.0 U
Carbon Disulfide	비	U	U	υl	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
Carbon Tetrachloride	U	U	u	ul	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
Chlorobenzene	230	260	110	220 J	64 J	500 U	200 J	120 J	180 J	37
Chloroethane	u	u	U	υl	200 UJ	500 U	500 U	500 U	1000 U	2.0 UJ
Chloroform	74 J	190 J	ul	ū	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
Chloromethane	υĺ	u	U	ū	200 UJ	500 U	500 U	500 U	1000 U	2.0 U
cis-1,3-Dichloropropene	U	u	اُن	ū	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
Dibromochloromethane	ul	υl	υl	ŭ	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
Ethylbezene	υl	56	53 J	290 J	30 J	20 J	300 J	170 J	170 J	1.0 U
Methylene Chloride	480	550	Ü	ul	200 UJ	500 U	500 U	500 U	1000 U	
Styrene	ul	U	ŭ	ŭl	200 UJ	500 U	500 U	500 U	1000 U	4.0 U
Tetrachloroethene	υĺ	ŭl	ŭ	ŭ	200 UJ	500 U	500 U	500 U	1000 U	1.0 U
Toluene	ul	ŭl	40 J	280 J	200 UJ	9 J	160 J	500 U	II	1.0 U
trans-1,3-Dichloropropene	υl	ŭl		200 0	200 UJ	500 U	500 U	500 U	130 J	0.26 J
Trichloroethene	ŭ	ĭil	ŭ	ĭI	200 UJ	430 J			1000 U	1.0 U
Vinyl Chloride	ŭ	ŭl	620	6400	300 J	520		31 J	1000 U	1.0 U
Xylene (total)	ŭl	ŭ	57 J	67	200 UJ	520 500 U	1900 J 89 J	1400	2100	2.0 U
Units: ug/L	<u> </u>		- 0, 0		200 00	300 0		31 J	1000 U	5.4

U = non-detected

TABLE 1 SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND PDWP GROUND WATER DATA

VOLATILE ORGANICS GROUP 3: SHALLOW BEDROCK WELLS

WELL NUMBER	GCA-1		GCA-1	GCA-1	GCA-1	GCA-1	GCA-1	GOA-1	GCA-1	GCA-1	GCAFI
COMPOUND	15 JAN 8	5	15 MAY 85	13 MAR 86	25 FEB 88	25 AUG 92	2 DEC 92	12 FEB 93	OR APP OR	24 MAD 054	18 NOV 99
1,1,1-Trichloroethane		Ū	U	U	Ū	200 U	200 L	J 200 UJ			50 U
1,1,2,2-Tetrachloroethane		υ	Ü	l u	Ū	200 U					50 U
1,1,2-Trichloroethane		U	Ū	l ŭ	Ü	200 U					50 U
1,1-Dichloroethane	}	U	Ū	บ	Ŭ	200 U			l .		50 U
1,1-Dichloroethene		U	U	ĺ ů	20	200 U				250 U	18 J
1,2-Dichloroethane		U	U	ان ا	U	i	1				50 Ŭ
1,2-Dichloroethene (total)	2300		8400	3000	4000	2500	3100	3900 J	4800	4500	11052
1,2-Dichloropropane	1-	U	U	U	u	200 U					
2-Butanone		U	Ü	Ü	Ŭ	200 U					1000 U
2-Hexanone		u	Ū	Ū	ŭ	200 U	-				500 U
4-Methyl-2-Pentanone	1	u	Ü	บไ	ŭ	200 U				250 U	500 U
Acetone		υl	U	l ŭl	Ü	200 U	1		-		1000 U
Benzene	210		200	130	100	41 J	31	43 J	48 J	77 J	470
Bromodichloromethane		υl	U	u	U	200 U					50 U
Bromoform		υ	U	Ū	Ū	200 U		1			50 U
Bromomethane		U	U	Ü	Ū	200 U					100 U
Carbon Disulfide	1	υl	U	u	Ū	200 U	1				50 U
Carbon Tetrachloride		u	U	U	U	200 U				250 U	50 U
Chiorobenzene	110	ļ	100	69 J	53	25 J	25 J	200 UJ	200 U	36 J	320
Chloroethane	i	υl	U	U	U	200 U	200 U		200 U		100 UJ
Chloroform	29		υl	ul	U	200 U			200 U		50 U
Chloromethane	1	u	u	ul	U	200 U			200 U	250 U	100 U
cis-1,3-Dichloropropene		u	u	ul	Ü	200 U			200 U		50 U
Dibromochloromethane		υl	υ	ul	Ū	200 U	E .	200 UJ	200 U	250 U	50 U
Ethylbezene	190		330	72	160	200 U	85 J	98 J	99 J	86 J	93
Methylene Chloride	790		u	υl	U	200 U		200 UJ		250 U	200 U
Styrene	1	u	úl	υl	23	200 U		200 UJ		250 U	50 U
Tetrachloroethene		υl	u	u	U	200 U	200 U	200 UJ	200 U	250 U	50 U
Toluene	110		190	44 J	130	200 U	40 J	32 J	200 U	250 U	74
trans-1,3-Dichloropropene		υl	ul	Ü	U	200 U		200 UJ		250 U	, 50 U
Trichloroethene	1900	ı	2400	240 J	1800	56 J	1300	1000 J	l .	370	160
Vinyl Chloride	260		430	110 J	92	120 J	150 J		210	290	1700
Xylene (total)	30		U	ul ul	6	66 J	200 U	,	200 U		59
Units: ug/L		_	<u></u> _l		<u> </u>				200 0	200 0	

Units: ug/L

U = non-detected

J = estimated

TABLE 1

SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND PDWP GROUND WATER DATA

VOLATILE ORGANICS GROUP 3: SHALLOW BEDROCK WELLS

WELL NUMBER DEPTH	ECJ41. 72	1ECJ-1 172	. ECJ리* 72	ECJ-1	ECJ-1	EQJ-13	ECJ-1
COMPOUND	15 MAR 88	20 AUG 92	.9 DEC 92	72' 10 FEB 93	72' 4 MAY 93	72: 23.MAR 95	72" 18 DEC 99
1,1,1-Trichloroethane	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
1,1,2,2-Tetrachloroethane	Ū	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
1,1,2-Trichloroethane	Ü	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	43
1,1-Dichloroethane	Ū	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0 50 U
1,1-Dichloroethene	Ū	530 J	450 J	5000 UJ	10000 U	10000 U	480 J
1,2-Dichloroethane	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	15
1,2-Dichloroethene (total)	6900	77000	67000 J	59000 J	110000	200000	120620 J
1,2-Dichloropropane	υ	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
2-Butanone	υ	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	10 U
2-Hexanone	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	5.0 U
4-Methyl-2-Pentanone	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	50 U
Acetone	ן ט	5000 UJ	5000 UJ	5000 UJ	10000 U	10000 U	10 U
Benzene	U	5000 U	5000 UJ	5000 UJ	450 J	10000 U	140 J
Bromodichloromethane	u	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Bromoform	υ	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Bromomethane	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	1.0 U
Carbon Disulfide	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0 50 U
Carbon Tetrachloride	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Chlorobenzene	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	2.2
Chloroethane	υ	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	1.0 UJ
Chloroform	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Chloromethane	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	1.0 U
cis-1,3-Dichloropropene	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Dibromochloromethane	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Ethylbezene	U	5000 U	670 J	1100 J	5100 J	5100 J	1900
Methylene Chloride	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	20 U
Styrene	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	1.8
Tetrachloroethene	υ	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	3.1
Toluene	U	5000 U	440 J	5000 UJ	10000 U	10000 U	360 J
trans-1,3-Dichloropropene	U	5000 U	5000 UJ	5000 UJ	10000 U	10000 U	0.50 U
Trichloroethene	57000	15000	36000 J	22000 J	100000	10000 U	19000
Vinyl Chloride	u	3700 J	1400 J	1800 J	3000 J	6200 J	2700
Xylene (total)	U	870 J	5000 UJ	5000 UJ	10000 U	10000 U	72
Units: ug/L						•	

U = non-detected

SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND PDWP GROUND WATER DATA

VOLATILE ORGANICS GROUP 4: OVERBURDEN WELLS

WELL NUMBER	MW-6A	T M	N-6A	NAVV-EA	MW.6		MAYU-EA		MW-6A	· MV/-EA	MAZ-BA	MW/-EA	MALSA	MW-6A	MAREKA
DEPTH								▓₺							
COMPOUND	17 JAN 8	5 17.	IAN 85	21 MAY 85	12 MAR	86	24 FEB 8	8	24 PEB 88	27 AUG 92	17 NOV 92	17 FEB 93	29 APR 63	24 MAR 95	te termi co
1,1,1-Trichloroethane		U	Ü	1	J	U		U	U	10 U	10 U	10 UJ	20 U		0.50 U
1,1,2,2-Tetrachloroethane		υĮ	U	ļι	ار	U		u	บ	10 U	10 U	10 UJ			0.50 U
1,1,2-Trichloroethane	İ	미	U	[ι	J I	U		υl	U	10 U	10 U	10 UJ		11	0.50 U
1,1-Dichloroethane		υ	U	ι	ر	u		υl	Ũ	10 U	10 U	10 UJ		50 U	0.96
1,1-Dichloroethene		u	U	į į	j	u		υl	U	10 U	10 U	10 UJ		50 U	4.3
1,2-Dichloroethane]	U	U	lι	ار	ul		υl	Ū	5 J	10 U			50 U	0.50 U
1,2-Dichloroethene (total)	320		360	26	15		490	Ť	470	85	98	270 J	260	730	1216
1,2-Dichloropropane		υ	U	lι	أر	υl		υl	u	10 U	10 U	10 UJ		50 U	0.50 U
2-Butanone		U	U	lι	ןנ	υľ		ūΙ	34 J	10 U	10 U			50 U	
2-Hexanone		υ	U	lι	ıl	u		ūΙ	Ü	10 U	10 U	10 UJ		50 U	5.0 U
4-Methyl-2-Pentanone	ĺ	U 4	430	lι	ונ	υl		ūΙ	ŭ	10 U	10 U	10 UJ	20 U	50 U	5.0 U
Acetone		U	U	ι)	υľ		υĺ	Ū	10 U		10 UJ		50 U	10 U
Benzene		υł	66 J	26	19		36	Ī	36	45	34	21 J	19 J	27 J	30
Bromodichloromethane		υİ	U	ι	J	u		υl	U	10 U	10 U	10 UJ	20 U	50 U	0.50 U
Bromoform		u	U	ι)	ul		υl	Ū	10 U	10 U	10 UJ	20 U	50 U	0.50 U
Bromomethane		u	υ	ι	ı	υl		ūΙ	บั	10 U	10 U	10 UJ	20 U	50 U	1.0 U
Carbon Disulfide		U	υ	ι	ı	υl		ūΙ	Ū	10 U	10 U	10 UJ	20 U	50 U	0.50 U
Carbon Tetrachloride		u	U	ι	ı	υl		ūΙ	ū	10 U	10 U	10 UJ	20 U		0.50 U
Chlorobenzene]	υ l	85	30	25		29	1	28	36	36	24 J	23	30 J	60
Chloroethane	l	υ	U	ι	ı	υl		υĺ	u	10 U	10 U	10 UJ	20 U	50 U	11
Chloroform	67	-	90	Ĺ	ıl	ul		ŭΙ	ŭ	10 U	10 U	10 UJ	20 U	50 U	0.50 U
Chloromethane		υ	υĺ	Ĺ	rl .	υl		ūΙ	ŭ	10 U	10 U	10 UJ	20 U	50 U	1.0 U
cis-1,3-Dichloropropene	1	ul	U	L	ı !	υl		ūΙ	ŭ	10 U	10 U	10 UJ	20 U	50 U	0.50 U
Dibromochloromethane		u	U	L	ıl	υl		υl	ŭl	10 U	10 U	10 UJ	20 U	50 U	0.50 U
Ethylbezene		υ	U	ι	ı	υl		ūΙ	ŭ	10 U	10 U	10 UJ	1 J	50 U	0.50 J
Methylene Chloride		υl	U	l	ıł	u		ūΙ	ŭĺ	10 U	10 U	10 UJ	20 U	50 U	2.0 U
Styrene		υĺ	u	ί	ı	ul	1	ŭΙ	ŭ	10 U	10 U	10 UJ	20 U	50 U	0.50 U
Tetrachioroethene		υl	υl	L	1	ūΙ	1	ŭ	ŭl	10 U	10 U	10 UJ	20 U	50 U	0.50 U
Toluene		υl	Ū	ũ	1	ū	ĺ	ūΙ	ŭ	10 U	0.6 J	10 UJ	20 U	50 U	1.6
trans-1,3-Dichloropropene		υl	ū	ū		ūΙ	i	ũΙ	ŭl	10 U	10 U	10 UJ	20 U	50 U	0.50 U
Trichloroethene		υ[<u> </u>	52	8		ان	29	-	32	8 J	10 U	72 J	63	230	30
Vinyl Chloride		υĺ	ul	7		ūΙ	200		87	45	24	61 J	75	200	
Xylene (total)		ūΙ	ŭl	·		ŭl	200	ul	, ul	10 U	10 U	10 UJ	75 20 U	200 50 U	480
Units: ug/L		-1						<u> </u>	<u> </u>	10 0		10 03	20 0	50 U	1.1

Units: ug/L U = non-detected J = estimated

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SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND PDWP GROUND WATER DATA

VOLATILE ORGANICS GROUP 4: OVERBURDEN WELLS

WELL NUMBER	AET-WM	MW-13A	MVV-13A	MVI-13A	MW-13A	MOV-13A	MW-13A	MAN-13A	ACT-WM
DEPTH COMPOUND	*** *******								
1,1,1-Trichloroethane	17 JAN 55 U	13 MAR 86	25 FEB 88	10 U	18 NOV 92 10 U	12 FEB 93	28 APR 93 10 U	22 MAR 95	17 NOV 99
1,1,2,2-Tetrachloroethane	l ü		lü	10 U	10 U	10 U 10 U	10 U	10 U	0.50 U
1,1,2-Trichloroethane	l ü	_	U	10 U	10 U	10 U	10 U	10 U 10 U	0.50 U 0.50 U
1.1-Dichloroethane	l ü	_	l ü	10 U	10 U	10 U	10 U	10 U	0.50 U
1,1-Dichloroethene	1	l ŭ	Ü	10 U	10 U	10 U	10 U	10 0	0.50 U
1,2-Dichloroethane	l ii	Ŭ	90	10 U	10 U	10 U	10 U	10 U	0.50 U
1,2-Dichloroethene (total)	l ii	97 J	og u	10 U	17	8 J	25	72	15.22 J
1,2-Dichloropropane	1 1	9, 3	Ü	10 U	10 U	10 U	25 10 U	10 U	0.50 U
2-Butanone	ا ن	l ĭ	230 J	10 U	10 U	10 U	10 U	10 U	10 U
2-Hexanone	l ü	l ,	230 J U	10 U	10 U	10 U	10 U	10 U	5.0 U
4-Methyl-2-Pentanone	380	١	Ü	10 U	10 U	10 U	10 U	10 U	5.0 U 5.0 U
Acetone	J 555 U	l ä	Ü	10 U	10 U	10 U	10 U	10 U	10 U
Benzene	140	120 J	75	10 U	72	67	32	30	0.65
Bromodichloromethane	1-0	120 0	υ, U	10 U	10 U	10 U	10 U	10 U	0.50 U
Bromoform	l ŭ	Ĭ	u	10 U	10 U	10 U	10 U	10 U	0.50 U
Bromomethane	ĺ ŭ	Ĭ	Ü	10 U	10 U	10 U	10 U	10 U	1.0 U
Carbon Disulfide	l ŭ	l ŭ	u	10 U	10 U	10 U	10 U	10 U	0.50 U
Carbon Tetrachloride	i ŭ	Ŭ	Ü	10 U	10 U	10 U	10 U	10 U	0.50 U
Chlorobenzene	110	76 J	54	10 U	47	36	21	16	1.7
Chloroethane	ں '' ا	ان '' نا	u	10 U	10 U	10 U	10 U	10 U	1.0 UJ
Chloroform	80	ľ	Ü	10 U	10 U	10 U	10 U	10 U	0.50 U
Chloromethane	J	Ŭ	Ü	10 U	10 U	10 U	10 U	10 U	1.0 U
cis-1,3-Dichloropropene	l ŭ	ŭ	Ü	10 U	10 U	10 U	10 U	10 U	0.50 U
Dibromochloromethane	l ü	Ŭ	Ü	10 U	10 U	10 U	10 U	10 U	0.50 U
Ethylbezene	Ì ũ	5.1 J	8	10 U	10 U	1 J	0.4 J	10 U	0.50 U
Methylene Chloride	470	l ü	Ū	10 U	10 U	10 U	10 U	10 U	2.0 U
Styrene	U	Ū	Ü	10 U	10 U	10 U	10 U	10 U	0.50 U
Tetrachloroethene	Ū	Ü	Ü	10 U	10 U	10 U	10 U	10 U	0.50 U
Toluene	ان	2.7 J	Ü	10 U	1 J	1 J	10 U	10 U	0.10 J
trans-1,3-Dichloropropene	l ŭ	Ū	Ū	10 U	10 U	10 U	10 U	10 U	0.50 U
Trichloroethene	Ū	4.4 J	Ū	10 U	10 U	8 J	10 U	5 J	0.17 J
Vinyl Chloride	l ŭ	64 J	Ū	10 U	62	23	38	10 U	11
Xylene (total)	ľ	اں ا	Ú	10 U	1 J	10 U	10 U	10 U	0.50 U
Units: ug/L	-								0.00

Units: ug/L

U = non-detected

SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND PDWP GROUND WATER DATA

VOLATILE ORGANICS GROUP 4: OVERBURDEN WELLS

WELLNUMBER	MW-22A	- MW-22A:	MW-22A	-MW-22A	MW-22A	MW-22A	MW-22A	MW-22A	- MW-22A
DEPTH 2: 7 - 10: 10: 10: 10: 10: 10: 10: 10: 10: 10:	400		11.0	100	1			4.0	
COMPOUND F - 1	5 FEB 86 1	18 MAR 86	24 FEB 88					21 MAR 95	
1,1,1-Trichloroethane	ᅵ	υ	U	25 U	25 U	50 U	50 U	10 J	12 U
1,1,2,2-Tetrachloroethane	ᅵ	υ	U	25 U	25 U	50 U	50 U	50 U	
1,1,2-Trichloroethane	ᅵ 이	U	υ	25 U	25 U	50 U	50 U	50 U	
1,1-Dichloroethane	U	υ	U	25 U	25 U	50 U	50 U	50 U	
1,1-Dichloroethene	U	υ	U	25 U	25 U	50 U	50 U	50 U	
1,2-Dichloroethane	U	U	U	25 U	25 U	50 ป	50 U	50 U	12 U
1,2-Dichloroethene (total)	2300	1200	84	16 J	25 U	50 U	3 J	50 U	24 U
1,2-Dichloropropane	u	υ	U	25 U	25 U	50 U	50 U	50 U	12 U
2-Butanone	l ul	U	U	25 U	25 U	50 U	50 ป	50 U	250 U
2-Hexanone	l u	υl	U	25 U	25 U	50 U	50 บ	50 U	120 บ
4-Methyl-2-Pentanone	U	U	U	25 U	25 U	50 U	50 U	50 U	120 U
Acetone	υ	U	U	25 UJ	25 U	50 U	50 U	50 U	250 U
Benzene	120	160	87	190	160	200	230	200	670
Bromodichloromethane	l ul	υ	U	25 U	25 U	50 U	50 U	50 U	12 U
Bromoform	U	υ	U	25 U	25 U	50 U	50 U	50 U	12 U
Bromomethane	u	U	U	25 U	25 U	50 U	50 U	50 U	25 U
Carbon Disulfide	l ul	U	U	25 U	25 U	50 U	50 U	50 U	12 U
Carbon Tetrachloride	U U	U	U	25 U	25 U	50 U	50 U	50 U	12 U
Chlorobenzene	140	230	340	460	390	430	410	730	42
Chloroethane	υl	U	U	25 U	25 U	50 U	50 U	50 U	25 U
Chloroform	U	U	U	25 U	25 U	50 U	50 U	50 U	12 U
Chloromethane	υl	U	U	25 U	25 U	50 U	50 U	50 U	25 UJ
cis-1,3-Dichloropropene	U U	U	υ	25 U	25 U	50 U	50 U	50 U	12 U
Dibromochloromethane	υ	U	υ	25 U	25 U	50 U	50 U	50 U	12 U
Ethylbezene	3600	3500	3200	310	330	300	140	59	190
Methylene Chloride	81 J	U	U	5 J	25 U	50 U	50 U	50 U	50 U
Styrene	l ul	υl	U	25 U	25 U	50 U	50 U	50 U	12 U
Tetrachloroethene	l ul	U	U	25 U	25 U	50 U	50 U	50 U	12 U
Toluene	93 J	42 J	8	25 U	4 J	50 U	50 U	50 U	240
trans-1,3-Dichloropropene	Ü	اں	Ū	25 U	25 U	50 U	° 50 U	50 U	12 U
Trichloroethene	ان ا	ūl	Ŭ	25 U	25 U	50 U	50 U	50 U	12 U
Vinyl Chloride	1800	360	190	23 J	14 J	50 U	50 U	50 U	25 U
Xylene (total)	اں ا	U	32	27	25	30 J	30 J	23 J	640
Unite: ua/l		<u>-</u>							0.0

Units: ug/L

U = non-detected

<u>TABLE 2</u>
SULLIVAN'S LEDGE SUPERFUND SITE

VOCs IN MW-12A, 13A, AND 22A

			SYOPIOALDA		MARCH	
CONSTITUENT	WELL.	MAX	MEAN	MIN	1995	NOVEMBER 1993
TCE	MW-12A	0.3	0.3	1	U	N/A
TCE	MW-13A	8	6	8	5	0.17 J
TCE	MW-22A	U	U	3	U	U
1,2-DCE	MW-12A	4	2	3	U	N/A
1,2-DCE	MW-13A	97	44	23	72	15.22
1,2-DCE	MW-22A	2,300	720	14	U	U
Vinyl Chloride	MW-12A	3	3	100	U	N/A
Vinyl Chloride	MW-13A	64	48	30	υ	11
Vinyl Chloride	MW-22A	1,800	59	87	υ	U
Benzene	MW-12A	230	160	100	140	N/A
Benzene	MW-13A	140	77	30	30	0.65
Benzene	MW-22A	230	170	87	200	670

Notes:

- 1. MW-12A, MW-13A, MW-22A are considered representative of shallow collection trench ground water quality
- 2. Concentration in ug/l
- 3. N/A = Not Analyzed due to an obstruction within MW-12A

SULLIVAN'S LEDGE SUPERFUND SITE

VOCs IN DEEP BEDROCK RECOVERY WELLS

		802186234	STATE OF THE STATE	CONTRACTOR			
					MARCH	DECEMBER	JANDATY
CONSTITUENT	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	MAX	MEAN	MIN	1995	1999	2330
TCE	BEI-1	92,000	42,700	8,100	13,000	N/A	7500
TCE	BEI-2	190,000	92,000	20,000	42,000	3800	4200
TCE	BEI-3	9,000	6,400	4,900	5,900	14000	13000
1,2-DCE	BEI-1	22,000	11,900	2,600	34,000	N/A	21000
1,2-DCE	BEI-2	82,000	59,700	40,000	120,000	77000	30000
1,2-DCE	BEI-3	340	310	260	450	597	1400
Vinyl Chloride	BEI-1	500	500	500	U	N/A	650
Vinyl Chloride	BEI-2	3,400	2,700	2,000	U	8200	3900
Vinyl Chloride	BEI-3	U	U	ľ	ļυ	17	U
Benzene	BEI-1	U	U	U	320	N/A	68
Benzene	BEI-2	U	U	U	U	230	U
Benzene	BEI-3	U	įυ	U	l u	U	U
Total ²	BEI-1	114,500	55,100	11,200	47,320	N/A	29218
Total ²	BEI-2	275,400	154,400	62,000	162,000	89230	38100
Total ²	BEI-3	9,300	6,700	5,200	6,350	14614	14400

Notes:

- 1. Data from December 1992 Pump Test
- Total of: TCE, 1,2-DCE; Vinyl Chloride; and Benzene
 Concentration in ug/l

SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND PDWP GROUND WATER DATA

PCBs GROUP 4: OVERBURDEN WELLS

WELL NUMBER DEPTH	MW-22A	MW-22A	MW-22A	MW-22A	MW-22A	MV4-22A	AAV-22A	MVV-ZZA	M (1) (2)/3
COMPOUND	6 FEB 86	18 MAR 86	24 FEB 88	23 AUG 92	2 DEC 92	11 FEB 93	28 APR 93	21 MAR 95	17 NOV 98
Aroclor-1016	U	U	υ	1.0 UJ	500 U	1000 UJ	100.0 U	20 U	2.6 U
Aroclor-1221	υ	U	U	2.0 UJ	1000 U	2000 UJ	200.0 U	20 U	2.6 U
Aroclor-1232	U	U	U	1.0 UJ	500 U	1000 UJ	100.0 U	20 U	2.6 U
Aroclor-1242	U	U	U	1.0 UJ	500 U	1000 UJ	100.0 U	20 U	22*
Aroclor-1248	U	U	65.0 J	1.0 UJ	500 U	1000 UJ	100.0 U	20 U	2.6 U
Aroclor-1254	150.0 C	U	93.0 J	1.0 UJ	3100 J	5000 J	410 J	37	2.6 U
Arocior-1260	U	U	U	1.0 UJ	500 U	1000 UJ	100.0 U	20 U	3.2

Units: ug/L U= non-detected J= estimated

*= altered 1242 pattern

C=

Table 4

SULLIVAN'S LEDGE SUPERFUND SITE FIRST OPERABLE UNIT RI AND POWP GROUND WATER DATA

PCB+ GROUP 4: OVERBURDEN WELLS

WELL NUMBER CEPTH		MANA											***************************************
COMPOUND	17 JAN 85	T and the	TI MAY 65	12 MAP 86	24 FEB 88	24 FEB 88	27 ALG 92	17 NOV 92	17 FEB 93	20 APR 93	24 MAR 95		10 5 0 77 99
Aroclor-1016	U	U	Ü	U	U	U	1.0 U		1.0 W				
Arocior-1221	U	ᅵ	미	U	U	U	2.0 U	2.0 U	2.0 W	2.0 U	1.0 U	1.0 U	0.53 U
Aroclor-1232	U	U	υ	U	U	U	1.0 U	1.0 U	1.0 W	1.0 U	10 U	1.0 U	0.53 U
Aroclor-1242	U	U	υ	U	U	l u	1.0 U	1.0 U	1.0 W	1.0 U	1.0 U	1.0 U	0.53 ∪
Aroclor-1248	U	U	미	U	U	U	1.0 U	10 U	1.0 W	1.0 U	10 U	1.0 U	0.53 U
Aroclor-1254	1.6	1 39	1.0	U	U	l u	0 014 J	0.87 J	2.1 J	1.0 U	1.7	15	0 12 J
Aroclor-1260	U	U	U	U	U	U	1.0 U	10 U	1.0 UJ	1.0 U	10 U	1.0 U	0.53 ∪

Units: ug/L U = non-detected

TABLE 5 SULLIVAN'S LEDGE SUPERFUND SITE GROUNDWATER ANALYSIS (1) TOTAL VOCs vs. SVOCs

	Volatile Organic	Semivolatile Organic
Monitoring Well	Compound (Total)	Compound (Total)
ECJ 1 (37)	2297.60	24.10
ECJ 1 (62)	72610.10	118.00
ECJ 1 (72)	145265.10	152.40
ECJ 1 (122)	71910.51	100.50
ECJ 1 (148)	36477.22	109.40
ECJ 1 (267)	160.54	5.90
ECJ 2 (47)	2533.00	3,20
ECJ 2 (82)	1942.00	4.40
ECJ 2 (117)	55380.00	8.80
ECJ 2 (152)	400.40	0
ECJ 2 (187)	36058.00	2.60
ECJ 4 (62)	0.52	0
ECJ 4 (87)	0.55	0
ECJ 4 (132)	1.51	0
ECJ 4 (162)	71.15	3.50
ECJ 4 (227)	6.76	0
ECJ 4 (245)	15.23	0
GCA - 1	13946.00	247.40
MW - 12	104.06	25.80
MW - 13	991.30	0
MW - 13A	28.19	0
MW - 14	639.50	76.30
MW - 15	14.48	8.80
MW - 16	7.69	0
MW - 17	28.10	15.00
MW - 2	2040.00	134.60
MW - 22A	1782.00	2231.30
MW - 24	743.01	66.90
MW - 4	1271.86	0
MW - 4A	1.79	0
MW - 5	0	0
MW - 5A	0	0
MW - 6	4837.20	5.60
MW - 6A	1835.07	4.60
MW - 8	0	0
MW - 8A	0	0

Notes:

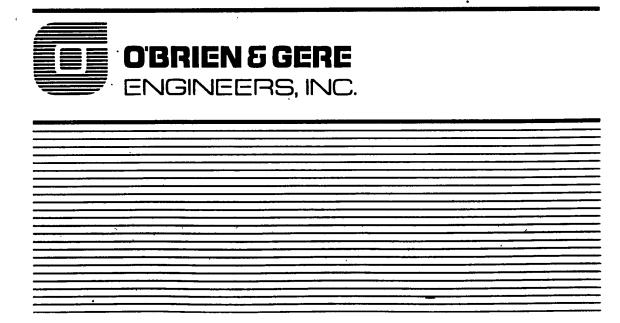
- (1) Samples collected Winter 1999/2000
- (2) All results in ug/L

Appendix A

Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) First Operable Unit

Sullivan's Ledge Site New Bedford, MA

January 2000



Report

Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) First Operable Unit

Sullivan's Ledge Site New Bedford, MA

January 2000



222 Forbes Road, Suite 400 Braintree, MA 02184

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Appendices

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- B Laboratory Quality Assurance Manual (QAM)
- C USEPA Low Stress Purging and Sampling Procedure for Collection of Ground Water Samples from Monitoring Wells (Revision 2, July 30, 1996)
- D SOP select sections

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Field SAP and Field QAPP

1. Introduction

1.1. Purpose and objectives

Section V.C. of the Statement of Work (SOW) for the First Operable Unit (OU-1) of the Sullivan's Ledge Superfund Site includes requirements for compliance monitoring for ground water. These requirements were further delineated in the report entitled "Post-Construction Environmental Monitoring Plan, Sullivan's Ledge Superfund Site, New Bedford, Massachusetts," (O'Brien & Gere, July 1997), which is included in Appendix A. The purpose of this document is to describe the sampling and analytical procedures to be followed to implement the ground water monitoring program described in Section 2 of the Post-Construction Environmental Monitoring Plan. Separate Field Sampling Plans (FSPs) will be developed for the Groundwater Treatment Plant (GWTP) influent, effluent, and process flow, as well as landfill gas, surface water, soil, and sediment sampling.

1.2. Technical guidelines

Site activities will be conducted in accordance with the following documents:

1) Massachusetts Department of Environmental Protection Standard References for Monitoring Wells (1991, revised 1994) select sections in Appendix D), referred to herein after as Standard Operating Procedures (SOP); 2) Compendium of Superfund Field Operations Methods, OSWER Directive 9355.0-12, USEPA/540/P-87/001; 3) Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (USEPA, 1983 - USEPA/QAMS 005/80); 4) Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (USEPA Pub. SW-846 Third Edition as amended by update 1986); 5) the Field Sampling Quality Assurance Project Plan (Field QAPP) prepared for this project (see Section 3, Field QAPP); 6) O'Brien & Gere Engineers, Inc. Quality Assurance Manuals (QAM); and 7) USEPA Region I Low Stress (Low Flow) SOP (Revision No. 2, July 30, 1996; included in Appendix C).

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A comparison of the Compendium of Superfund Field Operations Methods and the MADEP Standard Operating Procedures has been conducted. Where guidelines or protocols are required for performing field activities differ, the stricter guidelines between the two documents have been referenced. Any modifications to the use of a protocol are discussed in the text of this report.

A copy of this Field Sampling and Analysis Plan, Field QAPP and Laboratory QAPP, along with copies of the above referenced guidance documents, will be available in the on-site field office.

1.3. Project organization

Personnel responsibilities are described below:

Site manager/team sampling leader

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Responsibilities include day-to-day review of field activities performed on site, overall management and coordination of field work, supervision and scheduling of work, and ensuring that project-specific plans and implementation of field investigations are in compliance with appropriate guidelines. Mr. Peter C. Savage, Jr. will serve as Site Manager and will be responsible for the overall performance of the site investigation operations. Mr. Richard R. Mall, Jr. will fulfill the responsibilities of Site Manager in his absence.

Project coordinator

Mr. James M. O'Loughlin, P.E., will serve as the Project Coordinator. As Project Coordinator, Mr. O'Loughlin will be responsible for providing the resources necessary to perform the program, monitoring the progress of the project to facilitate that scheduled milestones are achieved, and reviewing the quality of the work to verify that the product meets the quality standards set forth in this document.

Project manager

Mr. James M. O'Loughlin, P.E. will be the Project Manager. Mr. O'Loughlin has over ten years experience. As the Project Manager, Mr. O'Loughlin will be responsible for the overall management of the program. He will serve as the interface between regulatory agency personnel, the client, contractors, and O'Brien & Gere Engineers staff. He will also be responsible for monitoring the program's progress, regularly reviewing the project schedule, and reviewing work elements prior to submittal.

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Project hydrogeologist

Responsibilities include planning and reviewing ground water measurements and tests, ensuring that appropriate and valid results are obtained, and assessing the ground water flow regime. Mr. Guy A. Swenson, CPG, will serve as project hydrogeologist.

Sampling personnel

Responsibilities include proper collection, preservation, packaging, documentation, and initial chain-of-custody of samples until released to another party for storage or transport to the analytical laboratory. Responsibilities also include certain on-site analyses including calibration, quality control, recording of results, and maintenance of field equipment. The following individuals will serve as sampling personnel:

- Mr. Peter C. Savage, Jr.
- Mr. Richard R. Mall, Jr.
- Mr. Ryan E. Hill
- Mr. Nidal H. Samara

Data validator

Ms. Melissa Listman of O'Brien & Gere Engineers, Inc. Will be the data validator. Ms. Listman has ten years experience and has performed data validation for several sites in EPA Region I. Ms. Listman will be responsible for assessment of the data from the initiation of field sampling efforts through the data validation process. Ms. Listman will be involved throughout the program so that the data can be assessed in an ongoing manner which will allow the timely implementation of corrective actions as required to meet data quality objectives.

Health and safety officer (HSO)

Responsibilities include monitoring field activities so that the site work is conducted in accordance with the project specific Health and Safety Plan (HASP). The HSO will have authority to stop work if conditions exceed allowable limits. Mr. Peter C. Savage, Jr. will serve as the project health and safety officer.

Health and safety officer designee

The Project HSO may not be on site at all times. A sampling team member will, therefore, be designated to monitor procedures and report inconsistencies to the HSO in his absence.

1.4. Program revision, field changes, and corrective actions

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The Site Manager or his designee is responsible for all site activities. In this role, the Site Manager may, at times, be required to modify the site programs to accommodate site specific needs. When it becomes necessary to modify a program, the field personnel will obtain approval from the Site Manager for the anticipated change prior to the implementation of the necessary changes. Major changes, such as revisions to the testing procedures or deletions of sampling points, will be communicated to EPA and MADEP by the Project Manager, prior to taking action.

2. Field sampling and analysis plan

2.1. Overview of ground water monitoring program

Monitoring wells designated for sampling are delineated in Section 2 of the Post-Construction Environmental Monitoring Plan, which is included as Appendix A. A summary of the annual program is presented on Table 2.1; a summary of the quarterly program for the first four quarters is presented on Table 2.2; and a summary of the quarterly program for the quarters following year one is presented on Table 2.3. Analytical methods are presented in Table D-1 of the Laboratory QAM presented in Appendix B.

2.2. Field mobilization activities

Mobilization includes those activities required to be completed prior to conducting sampling. The following list identifies mobilization activities:

- Order field equipment
- Order sample bottles and coolers
- Assemble field team members
- Notify pertinent state, federal, and local agencies
- Package and transport field equipment to the site
- Obtain necessary property access and clearances
- Install decontamination areas and equipment storage facilities
- Contact agencies to schedule site "kick-off" meeting.

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EPA and MADEP will be notified at least two weeks prior to the initiation of field activities. This will provide EPA and MADEP (or their designated contractors) time to mobilize for collection of split samples. It is assumed that regulatory agencies or their contractors will provide their own sampling jars and bottles for split samples.

2.3. Qualitative well integrity testing

Implementation of qualitative well-integrity testing will be the first task to be completed after site mobilization. The well-integrity testing will occur and will proceed from the less contaminated wells to the more highly contaminated wells, based on current knowledge of water quality conditions at the site. The general sequence of well sampling is shown on Tables 2-1, 2-2, and 2-3.

The steps in evaluating the condition of existing monitoring wells will be to measure: 1) well and casing stick-up; 2) depth to water; and, 3) depth to the bottom of the well.

Water levels will be measured using an electrical water level tape, as outlined in SOP Section 5.1-3.3, Electrical Tapes (see Appendix D). A Solinst Canada, Ltd. Model 90791 electrical tape with polyethylene tape and stainless steel electrode, or a similar electrical device, will be the standard ground water elevation monitoring instrument. This instrument is capable of providing data accurate to 0.01 foot. One difficulty associated with electrical water level tapes is that condensation on the sides of the riser can cause an erroneous reading. If this occurs, the tape and probe will be removed from the well, wiped dry, and reinserted into the well. If erroneous measurements continue to be a problem, the ground water elevation will be measured with a tape and plunker.

Depth sounding of the bottom of the well will be performed using a weighted tape as described in SOP Section 5.1 Weighted Tape (plunker) see (Appendix D). The plunker will be lowered to the bottom of the well, and the bottom of the well will be identified when the tape goes slack. The stick-up heights and the measured total depth of the well will be compared to as-built well records to estimate whether or not the well casing or riser pipe has shifted or sedimentation has occurred. Significant amounts of accumulated sediment (i.e., if the well screen is plugged) may be removed by purging the well. After purging has been completed, if necessary, the well will be resounded and readings will be recorded in the Field Log Book.

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2.4. Health and safety

Ground water monitoring activities will be implemented in accordance with the project-specific Health and Safety Plan (bound separately). As described in the HASP, ground water sampling activities are anticipated to be completed using Modified Level C personal protective equipment.

2.5. Ground water sampling equipment

Ground water monitoring wells to be sampled during this program include conventional and Westbay wells. Conventional monitoring well techniques for sampling materials and decontamination are included in this section and further described in Appendix C. Further discussion of the Westbay sampling is provided in Section 2.6.11 below.

2.5.1. Field instruments

The following monitoring instruments will be used during field activities:

- Photovac MicroTIP, Hnu PI-101, OVA or similar Photo Ionization Detectors (PIDs)
- A pH meter
- A specific conductivity meter
- A temperature meter
- Turbidity meter
- eH, D.O. meters.

These instruments will be calibrated as described in Section 3.5., Calibration Procedures and Frequency of the Field QAPP, and maintained using the procedures described in Section 3.10., Preventive Maintenance, of the Field QAPP.

2.5.2. Well sampling materials

Each conventional well will be provided with dedicated positive displacement low-flow bladder type sampling and purging devices as described in Appendix C. Sampling procedures for Westbay wells are described further in Section 2.6.11.

2.5.3. Equipment calibration

Monitoring equipment will be calibrated prior to and at the end of each day's activities, in accordance with Section 6.2 of the SOP, included as Appendix D. Instrument calibration data will be recorded in the field logbook for each calibration event.

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2.5.4. Equipment decontamination

Ground water sampling equipment (excluding sampling jars and dedicated bladder pumps) will be decontaminated prior to each use according using an initial potable water/alconox rinse (incorporating scrubbing, if necessary), a potable water rinse, nitric acid rinse (ten percent), distilled/deionized water rinse, methanol rinse, hexane rinse, and a final distilled/deionized water rinse. Dedicated or disposable equipment decontamination will not be required.

2.6. Ground water sampling collection methodologies

2.6.1. Overview

Prior to obtaining a ground water sample, supporting procedures will be performed in order to demonstrate that: 1) the ground water sample was obtained in a manner reasonably consistent with previous site investigations; and 2) that the resultant laboratory analysis will be based on a sample collected according to established procedures. Therefore, the following procedures will be followed prior to collecting a ground water sample:

- Well setup activities: Well inspection; placing poly sheeting over well area; and OVM well head screening
- Measurement of the ground water elevation; (see Water-Level Measurement in Conventional Wells, in Section 2.6.3).
- Purging the well of standing water; (see Purging, in Section 2.6.4).
- Collection of field measurements (pH, electrical conductivity, etc.), (see Purging, in Section 2.6.4).

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2.6.2. Sequence of ground water sampling

Ground water sampling will proceed from the upgradient or background wells to the downgradient or contaminated wells to minimize the possibility of cross contamination. The general sequence of wells to be sampled is shown in Tables 2.1, 2.2, and 2.3.

2.6.3. Water level measurements

The following procedure outlines the steps required to collect the water level data in accordance with the requirements of SOP Section 5.1, Water-Level Measurements, see Appendix D.

- Check the well number for proper identification and location.
- Measure and record the height of protective casing above ground level to the nearest 0.1 ft with standard steel tape.
- After unlocking the well and removing any well caps, measure and record
 the ambient and well-mouth organic vapor levels using the photo ionization
 detector (PID). If the ambient air quality at breathing level is significantly
 above background as defined in the Health and Safety Plan, upgrade from
 Modified Level C to Full Level C protection.
- Measure and record the distance between the highest point on top of the
 well riser pipe and the corresponding top of the protective casing to the
 nearest 0.1 ft with a standard steel tape. Notch or indelibly mark the
 highest point on the well riser pipe top if none exists upon entering the
 well.
- Once the water level has stabilized, using the electronic water level meter, measure and record the static water level from the top of the well casing to the nearest 0.01 ft. If the presence of DNAPL or LNAPL historically existed, depth sounding will be conducted using of an immiscible phase probe capable of detecting DNAPL or LNAPL compounds; the probe will be lowered through the water column and will sound the depth of the well bottom and record the level of any immiscible layer detected; accuracy will be to the nearest 0.01 ft. Upon removing the water level or immiscible phase probe and wire, decontaminate them according to procedures outlined in Section 2.5.4 Equipment Decontamination.

2.6.4. Purging

After the wells have been measured and the volume of standing water has been calculated, each conventional well will be purged using procedures specified in Appendix C.

Westbay wells are considered to have continuous ground water flow through the sample ports. The ground water within each port is representative of the water in each fracture intersected by each Westbay zone. Therefore, the Westbay wells will not be purged prior to sampling. If an individual port in a Westbay well yields less than one liter of sample in one hour, this port will not be sampled.

At the completion of the well purging process, in-situ parameters will be recorded on the Ground Water Field Sample Data Record as shown on Figure 1. In addition, the method of well purging also will be described in the Field Log Book.

2.6.5. Sample collection

Sample collection from conventional wells will be conducted in accordance with Appendix C.

Samples will be collected in appropriate containers as listed in the Laboratory QAPP. The approximate number of samples and QA samples to be collected are summarized in Table 2.1, Analytical Methods (annually after year one); Table 2.2, Analytical Methods (quarterly during year one); and Table 2.3, Analytical Methods (quarterly after year one).

Samples will be logged with the date, sampling locations, and required analyses and will be placed in coolers to keep the samples at an approx. temp of 4°C for shipment to the analytical laboratory, consistent with the protocols specified in Appendix C.

After the samples have been collected, pertinent sampling data will be recorded in the Field Log Book as described in Section 2.6.11 and Appendix C. Following the completion of sampling activities, the protective well cap and lock will be secured.

2.6.6. Field QA/QC samples The following describes how field QC samples to be collected.

- Duplicates. Field duplicates consist of two samples collected independently at a sampling location during a single episode of sampling. Duplicates are analyzed to provide statistical information concerning sampling variability. Field duplicates will be submitted to the laboratory as blind duplicate samples. Field duplicates will be collected at a frequency of ten percent for each matrix and analyses.
- Equipment rinsates. Equipment rinsates (sometimes referred to as
 "equipment blanks" or "sampler blanks") are the final analyte-free water
 rinse sample collection equipment after decontamination in the field.
 Equipment rinsates are to be collected at a rate of one per sampling event,
 per sampling method used. No equipment rinsates are required for
 disposable or dedicated sampling equipment.
- Trip blanks. Trip blanks are prepared prior to the sampling event originating from the lab in the actual sample containers. Trip blanks are kept with the investigative samples throughout the sampling event. A trip blank consists of a sample vial filled with deionized/distilled water and preserved like an actual sample. They are packaged for shipment with the other samples and sent for analysis. There should be one trip blank included in each sample shipping container where VOCs are contained. The trip blank should be stored at the laboratory with the samples, and analyzed with the sample set. Trip blanks are only analyzed for VOCs only.
- Field blanks. A field blank is a sample of either the potable or the deionized/distilled water used in the decontamination of field equipment. Typically, one field blank is obtained from each decontamination water source for each sampling event.
- Matrix spike/matrix spike duplicate (MS/MSD) are laboratory duplicates samples. Additional samples volumes will be collected to provide the laboratory with sufficient samples to perform MS/MSD analyses as required by CLP. MS/MSD samples will include a pair of complete sets of samples for the same laboratory analyses as the original sample. MS/MSD samples will be collected at a frequency of five percent, or one for every twenty samples for each matrix and analyses.

For CLP protocol analyses, laboratory-generated QC samples are analyzed for the inorganic and organic constituents as specified in the respective EPA CLP Statements of Work. 2.6.7. Ground water filtration

Ground water samples collected for dissolved metals analysis will be placed into un-acidified plastic bottles and field filtered as soon as possible after sample collection. Filtration will be accomplished in the field using an in-line filtering device or vacuum filtration and 0.45 micron filters. Immediately following filtration, dissolved metals samples will be transferred to bottles pre-acidified with nitric acid by the laboratory. Unfiltered samples will also be transferred to bottles pre-acidified with nitric acid by the laboratory. A complete discussion of the filtration process is presented in Section 6.3-1 - Standard Field Filtration Procedures of the SOP, see Appendix D.

2.6.8. Sample identification

Samples collected for laboratory analyses will be identified with a numbering system that references the site name, media, location, depth, filtered/unfiltered designation and quality assurance (QA) sample designation as follows:

- The site name, "Sullivan's Ledge Site First Operable Unit" will be designated "Sullivan's Ledge, OU-1"
- The media to be sampled is ground water. The well type will be identified by the following prefixes:
 - ▶ BEI, OBG Production well
 - ▶ MW, GCA, ECJ Ground Water Monitoring Well
- The location will be given a numeric designation (e.g., 1, 2, 3, etc.)
- The depth will be designated by either a letter (e.g., A, B, S, D, etc.) or an actual depth or interval (e.g., 247 fbg)

The sample identification number will be recorded in the Field Log Book along with the sample depth. The sample identification system will be consistent with that used in previous investigations.

2.6.9. Sample handling, packaging, shipping and analysis Chain-of-custody forms, custody seals, and sample labels will be completed and samples will be handled, packaged, and shipped as described in Section 3.5 - Sample Custody of the Field QAPP.

2.6.10. Data recording

Field data will be recorded on the Ground Water Field Sample Data Record, presented as Figure 1, the final readings will also be recorded in the Field Log Book.

2.6.11. Field Log Book

Information to be recorded into the bound Field Log Book include:

- Well identification
- Well depth and measurement technique
- Static water level depth, date, time and measurement technique
- Presence and thickness of immiscible liquid (NAPL) layers and detection method
- Pumping rate, drawdown, indicator parameters values, and clock time, at the appropriate time intervals; calculated or measured total volume pumped
- Well sampling sequence and time of each sample collection
- Types of sample bottles used and sample identification numbers
- Preservatives used
- · Parameters requested for analysis
- Field observations during sampling event
- Name of sample collector(s)
- Weather conditions
- QA/QC data for field instruments
- Any problems encountered should be highlighted
- Description of all sampling equipment used, including trade names, model number, diameters, material composition, etc.

2.6.12. Westbay wells

Four wells (ECJ-1, ECJ-2, ECJ-3, and ECJ-4) are currently equipped with well-dedicated Westbay Sampling Systems. The Westbay System consists of a multi-port system attached to a central stand-pipe. Each monitoring zone is separated by a packer assembly that is inflated with nitrogen gas.

Procedures for measuring water levels, purging, and obtaining ground water samples from these systems are specific and distinct from the methodologies for conventional wells. Equipment necessary for collecting ground water samples from the Westbay units will be obtained from Westbay. The Westbay wells will be sampled by the sampling personnel trained by Westbay under subcontract. Electrical or pressure transducers will be used in conjunction with the Westbay system for the purpose of collecting water-head data.

Sampling of the Westbay Wells will be contingent upon results of fluid pressure testing by Westbay conducted in the first round. Results of this testing will be used to evaluate the conditions and usefulness of the existing well ports in meeting future data needs. Westbay well ports not sampled during an event, due to malfunction of the in-ground equipment, will be reviewed for repair prior to the subsequent round of ground water sampling.

2.6.13. Daily routine

Once the sampling team has mobilized to the site, the typical daily routine will consist of the following activities:

- 1. Mobilize to site
- 2. Calibrate instrumentation
- 3. Proceed to sampling location
- 4. Decontaminate all downhole equipment
- 5. Well inspection; poly sheeting
- 6. Open well and perform air monitoring at well head and in ambient air
- 7. Collect water level data and calculate purge volume
- 8. Purge well of required water into temporary storage drums or a portable polypropylene tank for transfer into the drums or treatment plant
- 9. Collect sample(s) into appropriate containers (including required QA sampling, equipment/blanks, etc., filter samples if required)
- 10. Close well
- 11. Complete Field Log Book entry, forms, etc., proceed to next location and repeat steps 4 to 10 until work day has been completed
- 12. Decontamination of equipment
- 13. Containerize fluids and personnel protective equipment
- 14. Calibrate instrumentation
- 15. Demobilize from the site.

At the end of each day, equipment forms, sampling labels and forms, chain-ofcustody records, and other documentation, will be completed and samples will be prepared for shipment. Sample pickup will occur each evening or by other arrangements in coordination with the laboratory.

2.7. Control and disposal of contaminated materials

All water generated from on-site activities will be treated on-site in the treatment plant or removed from the site by an authorized waste hauler for disposal.

All disposable field equipment or personnel protective clothing will be placed in DOT approved 55-gallon drums and disposed of beneath the cap or off-site in accordance with the appropriate SARA, RCRA, and state regulations.

2.8. Reporting

At the end of each sampling event, field activities and analytical results will be compiled into a summary report.

For annual reports:

- A summary of all data in tabular format (contaminant concentrations and water levels).
- Contour maps of contaminant concentrations (TCE, DCE, vinyl chloride, benzene, PCBs) and ground water levels.
- Graphs of contaminant trends in key wells.
- Discussion of data in terms of plume maps, data trends, plume containment, conclusions, and recommendations.

For quarterly reports:

- Tabulated data for the specific quarter.
- Contour maps of water levels.
- Discussion of data, conclusions, and recommendations.

When sampling becomes routine, an annual report which reports the results of multiple rounds may be submitted in lieu of individual reports, at the discretion of EPA.

Field SAP and Field QAPP

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3. Field quality assurance project plan (QAPP)

3.1. QAPP objectives

This Quality Assurance Project Plan (QAPP) presents specific quality assurance/quality control (QA/QC) criteria specific to the site and has been prepared in accordance with USEPA's Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80, December 29, 1980.

The purpose of this QAPP is to document the objectives, policies, organizations, functional activities, and specific QA/QC activities designed to achieve the data quality objectives (DQOs) of the environmental monitoring program such that the data generated will be of a known and acceptable level of precision and accuracy. DQOs are quantitative and qualitative statements that identify the quality of the environmental data required to support the decision-making process. DQOs define the total uncertainty in the data that is acceptable for each specific activity conducted during the monitoring program. This uncertainty includes both sampling error and analytical error. Zero uncertainty is the optimum; however, the variables associated with the process (field and laboratory) inherently contribute to the uncertainty of the data. The OAPP's overall objective is to keep the total uncertainty within an acceptable range that will not hinder the intended use of the data. Therefore, requirements are specified in this document for the following data quality parameters: detection and reporting limits, accuracy, precision, sample representativeness, data comparability, and data completeness and usability.

Analytical requirements equivalent to Level IV, as described in the USEPA guidance document: Data Quality Objectives for Remedial Response Activities (EPA 540/G-87/1003), will be achieved for laboratory analyses. This DQO level implies the use of USEPA analytical methods, reporting and deliverable requirements and validation of the data. Field analyses and measurements will adhere to Analytical Levels I and II. Level I implies the use of portable instruments for field screening, while Level II implies the use portable analytical instruments and calibration procedures for in-field

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measurements. The remainder of this QAPP describes the specific approaches that will be taken to achieve the required DQOs.

3.2. Project organization

While each person involved in the environmental monitoring activities and in the generation of data is implicitly a part of the overall project and quality assurance program, certain individuals have specifically designated QA/QC responsibilities. The field sampling project personnel are described in Section 1.3. The specific personnel associated with QA/QC requirements will be the OA/QC Officer and data validator.

Ms. Melissa Listman of O'Brien & Gere Engineers, Inc. will serve as Quality Assurance Officer (QAO) and data validator and will be responsible for overall project quality assurance. Ms. Listman will review project plans and revisions to the plans to maintain proper QA throughout the investigation. Ms. Listman will also be responsible for reviewing chemical data and validating laboratory analytical data. Ms. Listman will also be responsible for performance and system audits, data processing activities, data processing quality control, data quality review, corrective actions, and coordinating the QA/QC efforts between O'Brien & Gere Engineers, Inc., and O'Brien & Gere Laboratories, Inc.

O'Brien & Gere Laboratories, Inc. (Syracuse, New York) will provide analytical services for the monitoring activities. O'Brien & Gere Laboratories' Quality Assurance Manual, March 1998, is included in Appendix B. Laboratory personnel with QA/QC responsibilities include the Laboratory Project Supervisor, Laboratory Quality Control Officer, and Laboratory Sample Custodian are described in the laboratory QAM.

3.3. Quality assurance parameters

This section discusses the following five quality assurance parameters: precision, accuracy, representativeness, comparability, and completeness (PARCC parameters). Provided below are concise definitions of the PARCC parameters and quantitative requirements for precision, accuracy, completeness and sensitivity as they pertain to this project for field and laboratory measurements. Further, this section discusses the methods used to

evaluate precision, accuracy, and completeness, as well as, the procedures used to verify that the required representativeness and comparability goals are achieved.

3.3.1. Definitions of PARCC parameters

Precision describes the reproducibility of results. It is defined as the agreement between the numerical values of two or more measurements that have been made in an identical manner. Precision can be expressed in a variety of manners, including the absolute methods of deviation from the mean or median values, standard deviation and variance, or by relative methods, such as relative deviation from the mean or median. Precision will be evaluated through the analysis of laboratory, field, and matrix spike duplicate samples. Field duplicate analyses measure both field and laboratory precision; therefore, the results may contain more variability than laboratory duplicates which measure only laboratory performance. Section 3.13 contains the procedures and equations used to measure precision.

Accuracy is a measure of closeness of an individual measurement or an average of a number of measurements to the true value, and is expressed in terms of absolute or relative error. Accuracy will be evaluated through analysis of surrogate spikes, laboratory control samples (LCSs), and matrix spike/matrix spike duplicate (MS/MSD) samples. Surrogates are compounds similar in nature to the target analytes which are spiked into environmental samples, blanks, and quality control samples prior to sample preparation for organic analyses. MS/MSDs samples consist of environmental samples in which a predetermined concentration of a representative mix of the target analytes are added prior to sample preparation. MS/MSD analyses and surrogate recoveries are assessed to provide information on sample preparation and analysis procedure with respect to specific sample matrices. The evaluation of the results of these surrogate spikes is not necessarily straightforward. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. LCSs are standard solutions that consist of known concentrations of the target analytes spiked into laboratory distilled water or a clean sand. LCSs are prepared from reference materials that are either purchased from an external source or prepared independently from the calibration standards. LCS recoveries provide an independent verification on the calibration procedure and are used to evaluate method accuracy independently of sample matrix effects. Section 3.13 contains the procedures and equations used to measure accuracy.

Representativeness refers to the degree to which a sample taken from a site accurately represents the matrix being sampled. Representativeness will be maximized by the use of USEPA procedures for the collection and preservation of samples. Ground water, surface water and sediment sample locations were selected based upon previous data collected during the Remedial Investigation and RD, and based on Site hydraulics. As part of ground water sampling techniques, water quality will be monitored to verify representativeness.

Comparability refers to the use of consistent procedures, reporting units, standardized methods of field analysis and standardized data format with document control and data validation. Adherence to standard procedures maximizes the probability that data generated from different laboratories can be validly compared to one another.

Completeness refers to the process of obtaining required data as outlined in this QAPP. Completeness is calculated by determining the percentage of measurements judged to be usable for qualitative and quantitative purposes. Section 3.13 contains the procedures and equations used to measure completeness.

Sensitivity refers to a measurable concentration of an analyte which has an acceptable level of confidence. Sensitivity is established by laboratory method detection limits (MDLs) and practical quantitation limits (PQLs) as presented in the Laboratory QAM (Appendix B) and discussed in Section 3.7.

3.3.2. PARCC parameter goals

Project wide accuracy and precision will be evaluated based on individual measurements taken during sample analysis. Results for blanks, MS/MSDs, surrogates, and LCSs will be used to assess accuracy. Results for laboratory and MS duplicates will be used to assess laboratory precision. Laboratory and field blanks will not contain contaminants at concentrations greater than the practical quantitation limit (or five times this limit for common laboratory contaminants). Acceptance limits will be based on previously established laboratory control limits for samples of similar matrix. Laboratory control limits for accuracy and precision are discussed in Sections 3.10 and 3.13.

Field precision will be assessed through the analysis of field duplicate samples. Relative percent differences (RPDs) will be calculated and evaluated for field duplicate samples collected using a criteria of less than 50% for water samples. Project wide completeness has been established as 95%. Numerical

goals cannot be established for representativeness or comparability since these are qualitative concepts. In the event that accuracy and precision control limits are not met, the laboratory will implement corrective action procedures. The Quality Assurance Officer and Project Coordinator will be notified when these events occur. In some cases, corrective action procedures may involve resampling and reanalysis.

3.4. Sampling procedures

Sampling procedures are described in Section 2.

A summary table of the environmental and QC samples to be collected is included in Tables 2.1, 2.2, and 2.3. Containers that will be used, preservation, and holding time requirements are presented in the Laboratory QAM (Appendix B).

3.5. Sample custody

Chain of custody procedures will be instituted and followed throughout the project. These procedures include field custody, laboratory custody, and final evidence file custody. This procedure creates an accurate and legally defensible document that can be used to trace possession of a sample from its collection through extraction and final disposal. Upon completion of analysis, the Quality Assurance Officer or her assignee will begin assimilating the field and laboratory data reports. In this way, the evidence file for the project will be generated. The file will be chronologically arranged for ease of review. When the information has been gathered, the file will be inventoried, numbered, and stored for future reference.

The Chain of Custody Record (Figure 3) will be signed by the handlers of the sample. The Quality Assurance Officer must produce documentation that traces the samples from the field to the laboratory and through the process of extraction. The National Enforcement Center of USEPA has defined custody of evidence as follows:

- · in actual physical possession
- in view after being in physical possession
- in a locked laboratory
- in a secure, restricted area.

3.5.1. Field chain of custody procedures

Formal custody procedures will begin in the field. The laboratory will provide sample containers purchased from an USEPA certified manufacturer (I-Chem series 200 or equivalent). The laboratory will provide chain of custody forms (Figure 3) with shipment of sampling containers. Sample labels will be affixed to sampling containers and will be pre-labeled by the laboratory with the following information: project, preservation if applicable, and analyses required. The field sampler is responsible for filling out the remaining information with respect to sample location, date and time of collection, and initials of sampling personnel.

Chain of Custody Records will be completed in the field during sample collection. In the field logbook, samplers will note meteorological data, equipment employed for sample collection, well evacuation techniques, calculations, and information regarding collection of QA/QC samples. The following physical information will be recorded in the field logbook, on sample labels, and on chain of custody records by the field sampling team:

- project identification
- sampling location
- · required analysis
- date and time of sample collection
- type of sample (matrix)
- sampling technique
- preservation used if applicable
- initials of the sampler.

The field sampler signs the Chain of Custody Record when relinquishing custody and includes the form in an air-tight plastic bag in the sample cooler with the associated samples. Sampling containers will be packed in styrofoam sheets, and put in plastic bags to help prevent breakage and cross-contamination. Samples will be shipped in coolers containing ice and ice packs to maintain the inside temperature at approximately 4°C. Sample coolers will then be sealed with a custody seal prior to shipment. The custody seal will be an adhesive-backed tape that easily rips if it is disturbed. The custody seal is signed and dated by the field sampler. Samples are shipped to the laboratory by common over-night carrier or are delivered by O'Brien & Gere Engineers, Inc. If commercial vendors are used, they will be required to document the transfer of the package within their organization.

3.5.2. Laboratory control of incoming samples

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The laboratory will be responsible for proper sample handling, identification, and recording of sample custody from sample receipt to disposal. The laboratory sample custodian is responsible for sample log-in, storage, and laboratory chain of custody procedures. The laboratory sample custodian will be responsible for retaining shipping documents and verifying data recorded on the Chain of Custody Records.

Upon receipt, the sample custodians will follow the standard operating procedure (SOP) outlined below to verify sample integrity and chain of custody information.

- The integrity of the sample cooler is checked by verifying that the custody seal is intact.
- The internal cooler temperature is measured and recorded on the Case File Form under subsection "Comments/Discrepancy".
- The Chain of Custody Record is signed and dated to verify the time of sample receipt.
- · Sample containers are checked for breakage, leakage, or damage.
- Sample containers are verified against chain of custody records.
- The pH of preserved samples (except for volatile organics) is measured and recorded in the laboratory sample log-in form to verify that preservation was performed in accordance with EPA method requirements.
- Each sample is assigned and tagged with a unique, sequential laboratory identification number.
- Samples are placed in a secured walk-in cooler maintained at 4°C ± 2°.
 Refrigerator temperatures are monitored and recorded daily by sample control personnel.
- · Sample control records are initiated.
- Samples are logged into the Laboratory Information Management System (LIMS) and the analyses are scheduled.

Documentation of custody seal integrity, temperature, preservation, and any problems with sample receipt are recorded in the case file and the Quality Assurance Officer is contacted immediately.

The Chain of Custody Record, case file form, sample control record, and original laboratory report form are maintained by the laboratory and copies of these forms will be included in the laboratory report.

3.5.3. Sample tracking

Laboratory sample numbers and client ID numbers will be recorded on raw data and preparation logs. Analysts will be responsible for recording pertinent information regarding sample preparation and analyses in bound laboratory notebooks and on appropriate tracking forms. It is the responsibility of the laboratory sample custodian and quality assurance officer to verify that proper chain of custody and sample tracking procedures have been maintained. Copies of the following items will be stored:

- Documentation of the preparation and analysis of samples, including copies of the analyst's notebooks.
- Bench sheets, graphs, computer printouts, chromatograms, and mass spectra.
- Copies of QA/QC data.
- Instrument logs showing the date, time, and identity of the analyst.
- Analytical tracking forms that record the date, the time, and the identity of the analyst for each step of the sample preparation, extraction, and analysis.

3.5.4. Location and disposal

Samples are stored in a secured walk-in cooler. The analysts will date and sign sample control forms when samples are removed and returned to secured storage. Sample extracts or digestates are stored in refrigerators in the appropriate laboratory section. Standards are stored in separate refrigerators in the appropriate laboratory section.

The method of sample disposal depends on the analytical data. The results are compared to RCRA criteria and a decision is made in connection with the hazardous waste officer as to the means of disposal. If the sample is classified as hazardous, it is placed in the appropriate drum in the hazardous waste room. Upon filling the drum, the hazardous waste officer manifests the drum, arranges for disposal and files the disposal logs.

3.6. Calibration and frequency

3.6.1. Laboratory equipment calibration

Calibration of laboratory analytical instrumentation is essential for the generation of reliable data which meets project data quality objectives. The calibration procedures to be followed are specified, in detail, in the analytical methods and laboratory SOPs. These procedures specify the type of calibration, calibration material to be used, and frequency of calibration. The laboratory will be responsible for the proper calibration and maintenance of laboratory analytical equipment. Documentation of initial and continuing calibration checks will be kept on file and be submitted as part of the laboratory report. A detailed description of instrument calibration is presented in the Laboratory QAM (Appendix B).

3.6.2. Field equipment calibration

Field measurements will be taken for pH, specific conductance, temperature and turbidity on ground and surface water samples. Field equipment will be calibrated, operated, and maintained in accordance with manufacturer's requirements.

Field equipment calibration

Field instruments include a pH meter, thermometer, conductivity meter, dissolved oxygen meter, and turbidity meter. Equipment to be used for the field sampling will be examined to confirm that it is in good operating condition. This includes checking the manufacturer's operating manual and the instructions for each instrument to confirm that the maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so that the notations on any prior equipment problems are not overlooked, and all necessary repairs to equipment have been carried out. Spare parts, including a spare pH meter electrode, and a second thermometer, will be sent to the sampling locations.

In general, instruments will be calibrated daily prior to use and will be recalibrated as required. The linearity of the instrument will be checked by using a 2-point calibration with reference standards bracketing the expected measurement. All the calibration procedures performed will be documented in the field logbook.

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pH meter calibration

The pH meter will be calibrated with standard buffer solutions before being taken into the field. In the field, the meter will be calibrated daily with two buffer solutions before use. The range of the buffer solutions will bracket the expected pH of the samples being measured. The following calibration procedure will be followed:

- Verify that the temperature of the sample and buffer are the same.
- Connect the pH electrode into the pH meter and turn on pH meter.
- Set temperature setting based on the temperature of the buffer; place electrode in the first buffer solution.
- After reading has stabilized, adjust "CALIB" knob to display correct value.
- Repeat procedure for second buffer solution.
- Place pH electrode in the sample and record the pH as displayed.
- Remove pH electrode from sample and rinse off with distilled water.
- Recalibrate the pH meter every time it is turned off and if it starts giving erratic results.

The calibrations performed, standard used, and sample pH values are to be recorded in the Field Log Book.

Conductivity meter calibration

The conductivity cells of the specific conductivity meter will be cleaned and checked against known conductivity standards before being taken to the field. In the field, the instrument will be checked with traceable reference standards. The following calibration procedure will be followed:

- Place the probe in the conductivity calibration standard solution.
- Set the temperature knob for temperature of standard solution.
- Turn to appropriate scale and set the instrument for the value of the calibration standard.

- Rinse off the electrode with distilled water.
- Measure the conductivity for distilled water to be used for a field blank, making sure the temperature is set correctly for temperature of the solution to be tested.
- If the conductivity of the blank (distilled water) is high, it must be discarded and a new blank sample obtained.

All readings and calibrations should be recorded in the Field Log Book.

Turbidity meter calibration

To obtain consistently accurate results, calibrate the device before each set of tests in the following manner:

- Turn the instrument off and check the mechanical zero setting. Adjust the screwdriver adjustment control on the meter face if necessary to obtain a zero-NTU reading.
- Press the power switch to ON and perform a battery check by pressing the BATT CHECK switch and verifying that the meter indicates in the BATTERY CHECK area. If not, charge the battery pack.
- Place the focusing template into the cell holder. The focusing template will block all light from reaching the detector and allow the instrument to be zeroed electronically in subsequent steps.
- Press the 1.0 range switch and adjust the ZERO control for a reading of zero-NTU.
- Press the 10 range switch and verify that the meter still indicates zero-NTU. Readjust the ZERO control if necessary.
- Remove the focusing template and place the 9-NTU turbidity standard into the cell holder. Use the black dot on the standard vial to orient the vessel in the same position each time, thereby minimizing variations due to rotation.
- Place the light shield over the turbidity standard and allow the meter to stabilize.

 Adjust the SPAN control for a reading of 9-NTU. Remove the light shield and turbidity standard. The instrument is now ready for use.

Turbidity will be measured with a portable turbidity meter. The turbidity meter will be calibrated daily. Tables 2-1, 2-2, and 2-3 in the FSP summarizes the field QA/QC program.

3.6.3. Standards

Standards may be generally grouped into two classifications: primary and secondary. Primary standards include United States Pharmacopoeia (USP) drugs, National Institute of Science and Technology (NIST) and ASTM materials, and certain designated EPA reference materials. Other standards are considered secondary. Testing of primary standards is not necessary. Primary standards will not be used if there is any physical indication of contamination or decomposition (i.e. partially discolored, etc.) or if the manufacturer's expiration data has passed. Secondary standards should be examined when first received, either by comparison to an existing primary standard or by comparing known physical properties to literature values. The less stable standards will be rechecked at appropriate intervals, usually six months to one year. Laboratory analytical methods will be calibrated with EPA certified standards. These standards are considered primary. Secondary standards will be used for other QC samples.

3.6.4. Records

Documentation of standard receipt and preparation will be maintained in a bound standards log. Standards log entries will also be stored on a database and will include the following:

- · manufacturer name and lot numbers,
- · purity and concentration of standard solution,
- initials of preparer,
- method of preparation, including special storage requirements,
- · date received and/or prepared, and,
- · expiration date.

Standard solutions are validated prior to use. Validation procedures range from a check for chromatographic purity to verification of the concentration of the standard using a standard prepared at a different time or obtained from a different source. Reagents and solvents are examined for purity by subjecting an aliquot or sub-sample to the analytical method in which it will

be used: for example, lots of methylene chloride used in organic extractions are analyzed for undesirable contaminants prior to laboratory.

3.7. Analytical procedures

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3.7.1. Analytical methods

Samples will be analyzed using USEPA approved methods summarized in Tables 2.1, 2.2 and 2.3. The laboratory maintains detailed SOPs for analytical procedures.

3.7.2. Method detection limits and practical quantitation limits

Laboratory method detection limits (MDL) and practical quantitation limits (PQLs) are summarized by the analytical method and matrix in the Laboratory QAM (Appendix B) The MDL is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte is greater than zero. The MDL is an empirically derived value from replicate analyses of clean matrix (organic-free water or sand) spiked with known concentrations of analytes in accordance with the procedures specified in the analytical methods and from 40 CFR 136 Appendix B (Federal Register 10/26/84). The MDL is used to estimate the lowest concentration a method can detect. MDLs are updated periodically. The PQL is an established value where the precision and accuracy are assumed to be defined and it must be greater than or equal to the empirically derived MDL. Laboratory PQLs are verified through the analysis of calibration standards prepared at 1-5 times POLs. When a target analyte is detected above the MDL but below the PQL, the laboratory will quantitate the concentration. This value will be flagged with a "J" qualifier to indicate that the concentration is an estimate since the precision and accuracy of the method at this level are not defined.

When matrix interferences are noted during sample analysis, actions will be taken by the laboratory to achieve the specified PQLs. Samples will not be diluted to reduce matrix effects unless the analytes of concern generate responses above the linear calibration range of the instrument. The laboratory will re-extract, re-sonicate, and/or use any of the clean-up methods presented in SW-846. These actions will be documented in the case narrative of the laboratory report.

3.8. Laboratory data reduction, review, and reporting

3.8.1. Data reduction

Data reduction consists of manual and computer data reduction procedures and calculations. Computer data reduction procedures and calculations will be checked manually by the laboratory to verify that identifications and quantitations adhere to method requirements. The laboratory will be responsible for maintaining a listing of computer-based data reduction programs and SOPs for data reduction. Sample preparation or extraction logs will be used to document sample preparation information (for example, preparation weights, volumes, reagents). Instrument injection logs or bench sheets will also be maintained for each instrument.

Qualitative identification and quantitation of organic analytes will be performed by experienced analysts in accordance with analytical method requirements.

3.8.2. Laboratory data review

Analytical results will be entered into the LIMS by the analyst, independently reviewed by another analyst or supervisor experienced in the method, and approved by the Laboratory Manager. The following requirements will be examined as part of this review:

- Initial calibration criteria were met. Standards in the calibration curve covered the expected concentration ranges of the samples including the practical quantitation limit.
- Initial and continuing calibration verification checks met the acceptance criteria defined in the method standard procedure.
- Sample results fell within the range of the standard curve.
- For GC/MS methods requiring internal standards, retention times and area responses were evaluated against limits established by the daily calibration.
- Method blanks were processed with each analytical batch and no detectable levels of contamination were identified.
- MS/MSDs were performed at the required frequency and recoveries were within acceptable control limits.

- Duplicate analyses were performed at the required frequency and results of MSDS or laboratory duplicates were within the control limits.
- LCS analyses were performed with each analytical batch and the results obtained were within control limits.
- For organic compound analyses, surrogate spike recoveries was within control limits.
- Compounds identified by GC/MS have been manually rechecked by comparison with the data system library for both target compounds and tentatively identified compounds. Retention times and ratios of fragmentation were verified.
- Calculations have been accurately performed.
- Data for the analysis provide a complete audit trail.

The analyst's supervisor will check a minimum of 10% of the data back to raw data in the secondary review. This review is evidenced by a supervisor's signature on the data page. A tabulation of results will be submitted to the supervisor during the data review. When required analyses on the samples in a project are complete, entered, and reviewed, a report will be generated. The report will be forwarded to the assigned Laboratory Project Supervisor for review. The Laboratory Project Supervisor's review will cover the following points:

- QC data will be reviewed to identify whether or not internal specification and contract requirements have been met.
- Non-conformance reports, if any, were reviewed for completion of corrective action and impact upon results. Noncompliance and corrective action procedures are documented as case narrative in the final report.

The report requires the signature of the Laboratory Project Supervisor and the laboratory manager. Electronic data are copied onto computer tape, inventoried, and stored off site in a secure facility, or within locked cabinets on site. This data archive system is maintained minimally for ten years.

Following final review, two copies of the report will be shipped to O'Brien & Gere Engineers, Inc.

3.8.3. Laboratory reports

Laboratory reports will adhere to SW-846 requirements. The data report forms will be securely bound and all pages will be sequentially numbered. Reports will include the following information:

- Case narrative report containing a summary of the samples collected, problems with sample receipt, methods employed, QA/QC excursions, corrective action procedures.
- Cross referenced table of client sample identifications, laboratory sample identifications, date of sample collection, and date of sample receipt
- Case file containing documentation of cooler temperature and preservation checks performed.
- Copies of completed chain-of-custody records.
- Internal laboratory chain of custody records.
- Analytical results of environmental samples, field duplicates, equipment blanks, and trip blanks with appropriate PQLs.
- Surrogate recovery results.
- Batch specific QA/QC results for laboratory method blanks, MS/MSDs or MS/laboratory duplicates, and LCSs.
- Summary tables of control limits used to assess surrogates, MS/MSDs, MS/laboratory duplicates, and LCSs.
- GC/MS tuning and calibration data summarized.
- · Internal standard summary forms.
- Summary table of MDLs and PQLs.
- Extraction bench sheets, digestion logs, injection logs.
- Appropriate raw instrument outputs for samples, blanks, QA/QC samples, and calibration standards.

3.9. Data validation

The analytical laboratory data generated will be validated by O'Brien & Gere Engineers, Inc. personnel experienced with and familiar with the interpretation of analytical data and USEPA-New England validation guidelines. Data validation will be performed in accordance with QA/QC criteria established in the analytical method, in this QAPP, and in USEPA's Region I EPA - New England Data Validation Functional Guidelines For Evaluating Environmental Analyses July 1996 revised December 1996, or in most recent USEPA New England Region guidelines.

Data validators will be responsible for reviewing the laboratory reports with respect to Chain of Custody Records, sample tracking records, holding times, calibration, blank analyses, detection limits, laboratory QC analyses and control limits, corrective actions, compound identification and quantitation, instrument performance, and data package completeness. Data validators will review field records with respect to completeness, sample identification, correlation of field data, identification of anomalous field data, and accuracy and precision of field measurements. Data validators will recalculate a minimum of 10% of laboratory sample calculations using raw data when verifying sample results. In addition, data validators will review raw data at a frequency of ten percent to verify that compound identification was performed correctly and that transcription errors are not present. Complete data packages will be maintained on file and made available to USEPA upon request.

Data quality will be evaluated using laboratory control limits. When possible, laboratory control limits will be evaluated against control limits established in the analytical methods. When method control limits are not available, professional judgement will be used by the data validators to verify that laboratory control limits will produce data of high quality. Any control limits outside of the acceptable range specified in the method shall be identified. Sample data will be qualified based on excursions from laboratory control limits. Data not within control limits require corrective action by the laboratory. Data validators will check corrective action reports and results of reanalysis if available. Corrective actions implemented by the laboratory will be referenced in the data validation report.

Minor deficiencies in the data generation process noted in the data validation will result in approximation of sample data. Approximation of a data point indicates uncertainty in the reported concentration of the chemical but not its assigned identity. Major deficiencies noted in the data validation will result in the rejection of sample results. Rejected data would be considered unusable

for quantitative or qualitative purposes. Data qualifiers may include the following:

- U Indicates that the compound was analyzed for, but was not detected. The sample quantitation limit is presented and adjusted for dilution and percent moisture. This qualifier is also used to signify that the detection limit of an analyte was raised as a result of analytes detected in laboratory and/or field blank samples.
- J Indicates that the detected sample result should be considered approximate. This qualifier is used when the data validation process identifies a deficiency in the data generation process. Additionally, for organic analyses this qualifier is used either when estimating a concentration for tentatively identified compounds or when the mass spectra data indicate the presence of a compound that meets identification criteria but, the sample result is less than the compound quantitation limit.
- UJ Indicates that the detection limit for the analyte in this sample should be considered approximate. This qualifier is used when the data validation process identifies a deficiency in the data generation process.
- R Indicates that the previously reported detection limit or sample result has been rejected due to a major deficiency in the data generation procedure. The data should not be used for qualitative or quantitative purposes.

If compounds are detected at concentrations greater than MDL, data will be qualified based on blank action level calculated at five times (ten times for common laboratory contaminants) the highest concentration detected in the associated blanks. Samples collected, prepared, or analyzed in conjunction with contaminated blanks, which contain analytes less than calculated action levels, will be qualified as blank contaminants and flagged with the "U" qualifier. For solid samples, the action level will be calculated taking into account preparation weights and volumes and percent solid determinations. Qualification of sample results will be based on date of analysis for calibration blanks, date of sample preparation for method blanks, and date of sample collection for trip and equipment blank samples.

The following method specific QA/QC parameters will be evaluated during the data validation, as appropriate to the analytical method:

- Holding Times
- GC/MS Tuning Criteria
- Initial and Continuing Calibration
- ICP Interference Check Sample and Serial Dilution Analyses
- Blank Analysis
- Surrogate Recovery
- MS/MSD Analysis
- Field Duplicate Analysis
- LCS Analysis
- Internal Standards Performance
- Compound Identification and Quantitation (10% Frequency)
- System Performance
- Documentation Completeness
- Overall Assessment

3.10. Internal QA/QC samples

3.10.1. Laboratory QA/QC samples

A description of laboratory QA/QC checks, frequency of analysis, control limits, and corrective actions to be implemented if excursions are observed is presented in the Laboratory QAM in Appendix B.

3.10.2. Control limits

Laboratory control limits are established separately for matrix type (and concentration level for VOC analyses) for duplicate, MS, reference standard, and surrogate analyses. Laboratory control limits can be considered action limits. These limits are defined as ±three standard deviations of the mean and correspond to 99.7% confidence limits of a normal distribution curve. The laboratory will establish control limits for each analyte of concern using a minimum of twenty data points. Laboratory control limits are summarized in the Laboratory QAM presented in Appendix B.

Laboratory control limits are subject to change since limits are continually updated with the addition of new data points. During the validation, laboratory control limits will be reviewed against EPA method limits, where applicable, to verify that laboratory control limits used will produce data that meets data quality objectives.

The laboratory control limits used to assess data for this program will be summarized by the laboratory in the analytical report.

3.11. Performance and system audits

A performance audit is a review of the laboratory's operation to verify that the necessary facilities, equipment, staff, and procedures are in place to generate acceptable data. O'Brien & Gere Engineers, Inc. routinely performs performance audits prior to initiation of work with the specified laboratory. A performance audit of field activities will be performed by the Quality Assurance Coordinator or designee at the beginning of the field program to evaluate the field program with the requirements specified in this document and the FSP. The Quality Assurance Coordinator will report to the Project Coordinator the results of the audit.

The Quality Assurance Officer, and Data Validator, in conjunction with the Laboratory Quality Control Officer, the analyst, the analyst's supervisor, and the Project Manager will formulate recommendations to correct any deficiencies in the analytical protocol or data observed during the validation process. These corrective measures will be in accord with the laboratory's Quality Assurance Manual and this QAPP.

A system audit verifies the ability of the laboratory to correctly identify and quantitate compounds in blind check samples submitted by a regulatory agency. O'Brien & Gere Laboratories, Inc. participates in the following performance evaluation sample programs:

- USEPA semiannual drinking water performance check samples (WS series)
- USEPA semiannual wastewater performance check samples (WP series)

In addition, the laboratory participates in the following regulatory audit programs

- New York State Department of Health for air emissions, potable water, wastewater, and hazardous waste.
- New York State Department of Environmental Conservation State Superfund.

- USEPA water pollution and water supply studies for Pennsylvania, New Jersey, Massachusetts, Connecticut, Rhode Island, and North Carolina
- US Air Force Center for Environmental Excellence
- US Army Corps of Engineers

O'Brien & Gere Laboratories, Inc. is certified by the state of Massachusetts (Figure QAPP-6) for potable and nonpotable water. The updated certificates will be provided to USEPA and MADEP as required. The laboratory has successfully completed USEPA's water supply series for 1994. The laboratory Quality Assurance Manual included as Appendix B was developed in accordance with the requirements presented in "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," USEPA 1983.

3.12. Preventive maintenance

Preventive maintenance procedures will be carried out on field equipment by O'Brien & Gere Engineers, Inc., personnel in accordance with the procedures outlined by the manufacturer's equipment manuals. Maintenance activities involving field equipment will be recorded in the Field Log Book.

A preventive maintenance schedule is followed per manufacturers' requirements specified in service contracts, and a maintenance log is kept for each instrument. Instrument downtime will be kept to a minimum by keeping service contracts on essential instrumentation, establishing routine maintenance procedures and schedules, and maintaining an adequate inventory of critical spare parts and equipment. Routine maintenance is performed to keep laboratory instruments running under optimum conditions and to reduce instrument malfunction. Specific preventive maintenance programs outlining required maintenance procedures and their application frequencies are incorporated in laboratory SOPs for each methodology.

Minimally, field and laboratory instruments will undergo maintenance on an annual basis and when calibration, blank, or QC analyses indicate that maintenance is necessary to correct or improve system performance. Maintenance, whether performed by laboratory personnel or by the manufacturer, is documented as an entry in the appropriate log. Log entries include the reason for maintenance, maintenance performed, date, and initials of the person in charge during maintenance.

The operating temperatures for refrigerators, coolers, ovens, and water baths will be monitored by the laboratory daily. The analyst will record the following information in a bound log book: equipment ID, temperature reading, date and time of reading, and analysts initials.

3.13. Field and laboratory procedures used to assess data precision, accuracy, and completeness

Field and laboratory procedures used to assess data precision, accuracy, and completeness.

3.13.1. Formulas

Accuracy - MS and reference standard analyses will be used to assess accuracy in terms of percent recovery.

%Recovery for MS analysis will be calculated as follows:

% Recovery = (MS result - Sample Result) x 100 Spiked Added

Recovery for reference standard analysis will be calculated as follows:

% Recovery = (Actual Result)/(True Value) x 100

Precision- Laboratory, MSD and field duplicate analyses will be used to assess precision in terms of percent relative difference (RPD). RPD for duplicate analyses will be calculated as follows:

RPD = <u>absolute value of (Original Sample Result - Duplicate Sample Result)</u> x 100 (Original Sample Result + Duplicate Sample Result)/2

Completeness - Data completeness will be calculated as follows for each individual method:

%Completeness = Number of Useable Data Points
Total Number of Data Points

38

3.13.2. Control limits

Accuracy and precision data will be evaluated using laboratory control limits through the analysis of MS, MSD, and/or LCSs. Laboratory established control limits are summarized in the Laboratory QAM (Appendix B). Control limits for field quality control sample analysis are established as less than fifty percent for detected results greater than five times the PQL

3.13.3. Documentation

Laboratory QC data will be recorded in notebooks and printouts in the same format used for sample data. The analyst will be responsible to verify QC information against control limits. When an analysis of a QC sample (blank, spike, duplicate, LCS) is not within control limits, the analyst will immediately notify the laboratory supervisor and/or QA manager. The appropriate corrective action will then be implemented.

3.14. Corrective action

3.14.1. Response

Laboratory corrective actions. Laboratory corrective action procedures will be implemented based on unacceptable audit results or upon detection of "out of control" QC data. Corrective action procedures are generally handled by the analyst who routinely reviews the preparation or extraction procedure for errors, checks the instrument calibration, and quality control analyses. If the problem persists or if previously reported data are affected by a situation which requires correction or in extreme cases resampling and reanalysis, or if the corrective action impacts a project budget or schedule, the action is referred to the Laboratory Project Supervisor. The Laboratory Project Supervisor will immediately notify O'Brien & Gere Engineers' Quality Assurance Officer of the discrepancies and the QA/QC corrective actions necessary.

Samples associated with out-of-control data will be identified in the data validation report. An assessment of the data useability will be addressed by the laboratory and the data validator with reference to the corrective actions taken. The laboratory will make every effort to establish when QC failure resulted from matrix effects.

Field corrective actions. Field corrective actions will be implemented as required to meet the guidelines set forth in Section 2. Field equipment will be maintained and calibrated in accordance with manufacturer's requirements. If field equipment malfunctions, sample collection will cease until the equipment is repaired or replaced. Laboratory pre-preserved containers are shipped to the site and are checked prior to initiation of field activities to verify that the correct type and number of containers are present to complete the sampling program. In addition, extra sampling containers are ordered from the laboratory to minimize downtime due to accidental breakage during sample collection. Samples are shipped on ice with appropriate sample labels, chain of custody records and custody seals within twenty-four hours of collection. Sample shipments must arrive at the laboratory within forty-eight hours of collection. Sample cooler temperature and sample preservation are checked by the laboratory upon receipt. If sample shipment, preservation, cooler temperatures, sample labels, custody seals, or chain of custody records requirements are not met, the Project Coordinator will be notified, corrective action will be implemented, or the affected samples will be recollected.

3.14.2. Re-establishment of control

When corrective action procedures are required, additional performance audits are scheduled to verify the effectiveness of the corrective action. The Project Coordinator, Laboratory Manager and/or the QA Department will continue to monitor activities relating to laboratory corrective action procedures to verify that the analytical system is operating "in control". Monitoring may involve additional analyses of QC samples, analyst training or supervision, or the updating of control charts.

3.14.3. Documentation

Laboratory corrective actions. Laboratory corrective action procedures are documented. The following information will be documented:

- date of implementation
- cause of "out of control" event
- · method of correction
- analyst responsible for implementation of corrective action
- OC data associated with re-establishment of control
- · date of re-establishment of control
- samples requiring reanalyses due to "out of control" event.

Field corrective actions. Field corrective action procedures will be documented in the Field Log Book and will include the following information:

- date of implementation
- · cause of "out of control" event
- method of correction
- · field personnel responsible for implementation of corrective action
- samples requiring resampling.

Corrective action procedures, resulting from laboratory of field performance or system audits, are summarized as part of the Laboratory Quality Control Summary.

3.15. Quality assurance reports to management

The deliverables associated with the tasks identified will contain separate QA sections in which data quality information collected during the task is summarized. Those reports will be the responsibility of the Project Coordinator and will include the Quality Assurance Officer's report on the accuracy, precision, and completeness of the data and the results of the performance and system audits, and any corrective action taken during the project.

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Table 2.1
Sullivan's Ledge Superfund Site
Analytical Methods (Annually after Year 1)
O'Brien & Gere Engineers

						Analysis		
	-		Ι		l	ľ		i
	Annual Sampling Point		Set **	PCB (Unfiltered)	VOCs	Metals (Filtered)	Metals (Unfiltered)	SVOC
Bedrockers Inskle/fusp	salArea -							
	MW-02		В	_ X	Х	Х	X	Х
	MW-12		Α	Х	Х	Х	X	Х
	MW-13		Α	X	X	X	X	Х
	MW-17		Α	Х	Х	X	X	Х
	MW-24		В	Х	Х	Х	X	X
	GCA-1		Α	Х	X	X	Х	Х
Subtotal				6	6	6	6	6
	-							
Ouiside dis								
	MW-04		C	X	Х	Х	X	X
	MW-05		С	X	Х	Х	X	Х
	MW-06		ပ	X	Х	Х	Х	X
	MW-08		D	Х	Х	Х	Х	Х
	MW-10		٥	X	Х	Х	Х	Х
	MW-10B		D	X	X	Х	X	Х
Subtotal				6	6	6	6	6
7772-77								
Westbay 2	FO 14				,			
	ECJ1	37	A	X	X	X	X	X
 		62	A	X	X	X	X	X
		72 122	A	X	Х	Х	X	X
			A	X	X	X	X	X
		148 267	A	X	×	X	X	X
	ECJ2	47	C	X	x	×	×	X
 	LOJZ	82	C	X	x	x	x	x
 		117	C	X	X	X	X	X
		152	ပပ	X	X	x	X	X
		187	C	X	X	X	X	X
	ECJ3	51	В	X	X	X	X	X
		91	В	Х	Х	X	X	X
		126	В	Х	X	Х	Х	X
		146	В	Х	Х	Х	Х	X
		236	В	Х	Х	Х	Х	Х
		271	В	Х	Х	X	Х	Х
	ECJ4	62	D	Х	X	X	X	X
		87	D ·	Х	X	Х	X	X
		132	D	Х	Х	X	X	X
		162	D	Х	Х	X	X	X
		227	D	X	Х	X	X	X
		245	D	×	Х	Х	Х	X
Subtotal				23	23	23	23	23

Table 2.1 Sullivan's Ledge Superfund Site Analytical Methods (Annually after Year 1) O'Brien & Gere Engineers

					Arabas		
	Annual Sampling Point	Set **	PCB (Unfiltered)	VOCs	Metals (Filtered)	Metals (Unfiltered)	
Nemijoer Islaa Disp	Moniomervels salvae						
	MW-12A	Α	Х	Х	X	Χ	X
	MW-13A	A	Х	Х	Х	X	Х
	MW-14	В	Х	Х	Х	Х	Х
	MW-15	В	Х	Х	Х	Х	Х
	MW-16	В	X	Х	Х	Х	Х
	MW-22A	Α	Х	Х	Х	Х	Х
ubtotal			6	6	6	6	6
urskie Dis	postali Alexa	100 050 000					
	MW-04A	С	X	Х	Х	Х	X
	MW-05A	С	Х	Х	Х	X.	Х
	MW-06A	С	Х	Х	Х	Х	X
	MW-08A	D	Х	Х	Х	Х	Х
	MW-10A	D	Х	Х	X	Х	Х
Subtotal			5	5	5	5	5
<u> </u>			46	462	1546	46	46
OAVQC	10%		5	5	5	5	5
Analytical N	Aothodo:						
analytical N PCB	netnoas: SW3520/SW808	2					
-CB	3443570/244808	2					

Except Mercury

3

SW5030/SW8260

voc

Metals* Mercury SW3010/SW6010

svoc '

SW7470 (Cold Vapor AA) SW3520/SW8270

Total Metals* SW/3010/6010/7470

Fitter

Water Digestion pН Notes:

* - RCRA Metals (As, Ba, Cd, Cu, Hg, Se, Ag, Pb)

** - Wells will be sampled in order by sets (B, D, C, then A)
Data validatable report

30 day turnaround

Table 2.2
Sullivan's Ledge Superfund Site
Analytical Methods (Quarterly Year 1)
O'Brien & Gere Engineers

Granding Set ** PCB (Unflittered) Metals (Filtered) Metals (Filtered)	
	SVOC
Bellock	
MW-02 B X X X X	X
MW-02 B X X X X X MW-12 A X X X X X	X
MW-12	X
MW-17 A X X X X	X
MW-24 B X X X X	Х
GCA-1 A X X X X	Х
Subtotal 6 6 6 6	6
Ouiside Disposal/Area/s	X
MW-05 C X X X X	X
MW-06 C X X X X	X
MW-08 D X X X X	X
MW-10 D X X X X	X
MW-10B D X X X	Х
Subtotal 6 6 6 6	6
ECJ1 37 A X X X X	 x
ECJ1 37 A X X X X X X X 62 A X X X X X	
72 A X X X X	Î
122 A X X X X	X
148 A X X X	X
267 A X X X X	X
ECJ2 47 C X X X X	X
82 C X X X X	X
117 C X X X	X
152 C X X X X X X 187 C X X X X	X
187 C X X X X X ECJ3 51 B X X X X X	x
91 B X X X	 x
126 B X X X X	X
146 B X X X X	Х
236 B X X X X	Х
271 B X X X X	Х
ECJ4 62 D X X X X	X
87 D X X X	X
132 D X X X	X
162 D X X X X	X
227 D X X X X X X 245 D X X X X X	X
245 D X X X X Subtotal 23 23 23 23 23	23
1 1 20 1 20 1 20 1 20 1 20 1 20 1 20 1	

Table 2.2 Sullivan's Ledge Superfund Site Analytical Methods (Quarterly Year 1) O'Brien & Gere Engineers

				Analyad		
Quaryrtly Sampling Point	Set **	PCB (Unfiltered)	SOON	Metals (Filtered)	Metals (Unfiltered)	oons
coencynten Montonini Wells Inside Esposal/Area						
MW-12A	Α	Х	X	Х	Х	X
MW-13A	Α	Х	Х	X	Х	Х
MW-14	В	Х	Х	X	X	Х
MW-15	В	Х	Х	Х	Х	X
MW-16	В	Х	Х	X	X ·	. Х
MW-22A	Α	Х	Х	X	Х	X
Subtotal		6	6	6	6	6
Outside Disposal Area	SAPELLE.					
MW-04A	С	Х	Х	Х	X	X
MW-05A	C	Х	Х	Х	Х	X
MW-06A	С	X	Х	Х	Х	Х
MW-08A	D	Х	Х	X	Х	Х
MW-10A	D	Х	Х	X	X	X
Subtotal		5	5	5	5	5
Totals — who is a second of the second of th		162,46 (4a)	3 46 A	46	46,31	46
QA/QC 10%		5	5	5	5	5

Analytical Methods:

PCB

SW3520/SW8082

voc Metals* SW5030/SW8260

SW3010/SW6010 **Except Mercury**

Mercury svoc

SW7470 (Cold Vapor AA) SW3520/SW8270

Total Metals* SW/3010/6010/7470

Filter

Water Digestion

рΗ Notes:

* - RCRA Metals (As, Ba, Cd, Cu, Hg, Se, Ag, Pb)

** - Wells will be sampled in order by sets (B, D, C, then A)

Data validatable report

30 day turnaround

Table 2.3
Sullivan's Ledge Superfund Site
Analytical Methods (Quarterly after Year 1)
O'Brien & Gere Engineers

						Analyais		
	Quaryrtly Sampling Point		Set **	PCB (Unfiltered)	VOCs	Metals (Filtered)	Metals (Unflitered)	·
Berijor:Kalay Inskie Dispo								
01151016152351545	MW-02		В	х	х		•	
	MW-12		Ā	X	X			
	MW-13		A	X	X			
	MW-17		Α	Х	Х			
	MW-24		В	X	Х			
	GCA-1		Α	Х	Х			
Subtotal				6	6			
(១៣១៨៤១)១ភ	osal Area							
in the book of the contract of the	MW-04		С	Х	X			
···-	MW-05		C	X	Х			
	MW-06		С	Х	Х			
	MW-08		D	X	Х			
	MW-10		D	X	Х			
	MW-10B		D	Х	X			
Subtotal				6	6			
westoay ***	ECJ1	37	A 14 PM					
	EWI	62	A	X	X			·
	•	72	Ā	x	x			
		122	Ā	X	x			-
		148	Ä	X	X			
	-	267	A	X	X			
	ECJ2	47	С	X	X			
		82	С	Х	Х			
		117	С	Х	Х			
		152	С	Х	X			
		187	С	X	Х			
	ECJ3	51	В	Х	X			
		91 126	B	X	X			
1		126	В	X	X			
		236	В В	X	X			
<u> </u>		271	В	x	×			
	ECJ4	62	Ď	x	x			
		87	D	X	X			
		132	Ď	X	X			
	····	162	,D	X	Х			
		227	D	Х	Х			
		245	D	X	Х			
Subtotal				23	23			
L								

						EXTENSE.	1.0	
	Quaryrtly Sampling Point		Set **	PCB (Unfiltered)	VOCs	Metals (Filtered)	Metals (Unfiltered)	Ç,
	Medibilio W space							
	MW-12A		Α	Х	X	×	×	×
	MW-13A		A	Х	Х	Х	X·	X
	MW-14		В	Х	X	X	X	Х
	MW-15		В	Х	Х	Х	Х	Х
	MW-16		В	X	_ X	X	Х	Х
	MW-22A		Α	X	X	Х	Х	X
Subtotal				6	6	6	6	6
Outside Disp	osjalAre≋ilää							
	MW-04A		С	Х	X	Х	X	X
	MW-05A		С	Х	X	X	X	X
	MW-06A		C	Х	X	X.	X	X
·	MW-08A		D	X	X	X	X	Х
	MW-10A		D	X	X	Х	X	X
Subtotal				5	5	5	5	5
Totals 34	a) yeren ya	Lar State		46	\$25 46 57 #	3 F #46 ()	46	1 46
QA/QC	10%			5	5	5	5	5
Duplicate	10%			5	5	5	5	5
MS	5%			3	3	3	3	3
MSD	5%			3	3	3	3	3
								
Totals				61	61	61	61	6

Except Mercury

Analytical Methods:
PCB SW3520/SW8082
VOC SW5030/SW8260

Metals*

SW3010/SW6010

Mercury svoc

SW7470 (Cold Vapor AA) SW3520/SW8270

Total Metals* SW/3010/6010/7470

Filter

Water Digestion

pH Notes

* - RCRA Metals (As, Ba, Cd, Cu, Hg, Se, Ag, Pb)
** - Wells will be sampled in order by sets (B, D, C, then A)

Data validatable report 30 day turnaround

Figure 1

4	O'BRIEN & GERE ENGINEERS, INC.	Ground Water Field Sample Data Record
•	Date:	Weather:
	Site Name:	Well Number:
§	Site Location	Project Number:
· -1	Personnel:	Evacuation Method:
•		
	Depth of Well *ft.	Water Volume /ft. for:
1-1	Depth to Water * ft.	2" Diameter Well # 0.163 X LWC
	Length of Water Column ft.	4" Diameter Well # 0.653 X LWC
	Volume of Water in Well gal (s) 3X Volume of Water in Well gal.(s)	6" Diameter Well = 1.469 X LWC
10	3X Volume of Water in Well gal.(s)	Volume removed before samplinggal.(s)
ł		Did well go dry? Yes No
1		
	**** - SMUR O	(Other, Specify)
	*Measurements taken from Top of Well Ca	Top of Protective Casing
	Water parameters:	•
Ē	Temperature Reading	pH Reading Conductivity Reading
I		4.0 Standard
		7.0 Standard 84 S Standard 4443 S Standard
	initial	10.0 Standard 1413 S Standard initial initial
•	after(gal.) after	er (gal.) after (gal.)
	after(gal.) after	er(gal.)
	arter (gal.) afte	er(gal.) after(gal.)
ı	after (gal.) after	er(gal.) after(gal.)
•	Water Sample:	I
	Time Collected:	
	Dh. da la	
	Physical Appearance at Start	Physical Appearance at Sampling
	Color	Color
1	Odor	Odor
ı	Turbidity (> 100 NTUs)	Turbidity (> 100 NTU's)
	Sheen/Free Product	Sheen/Free Product
- {	Sample Parameters:	-
	Container Size Container Type # 0	Collected Filtered Preservative pH Temp, Conductivity
1		
1		
'		
,		
~		
ı	Monitoring Well Integrity Checklist:	
Sel .	Well identification number clearly marked?	Yes No
7	Well covers and locks in good condition and secure?	Yes No Yes No
	Is the well stand pipe vertically aligned and secure?	YesNo
	Is the concrete pad and surface seal in good condition?	Yes No No No No No No No No No No No No No
-	Is the PVC well casing in good condition?	Yes No
•	Is there standing water in the annular space between the well s	stand pipe and PVC casing?Yes No
•	Is the stand pipe vented at the base to provide drainage?	
E 1	Does the total depth of the well sounded correspond with origin	nal well completion depths?Yes No
٦	NOTES: Top of casing elevation:	
	Depth to Ground Water:	
	Ground Water Elevation:	
<u></u> _		

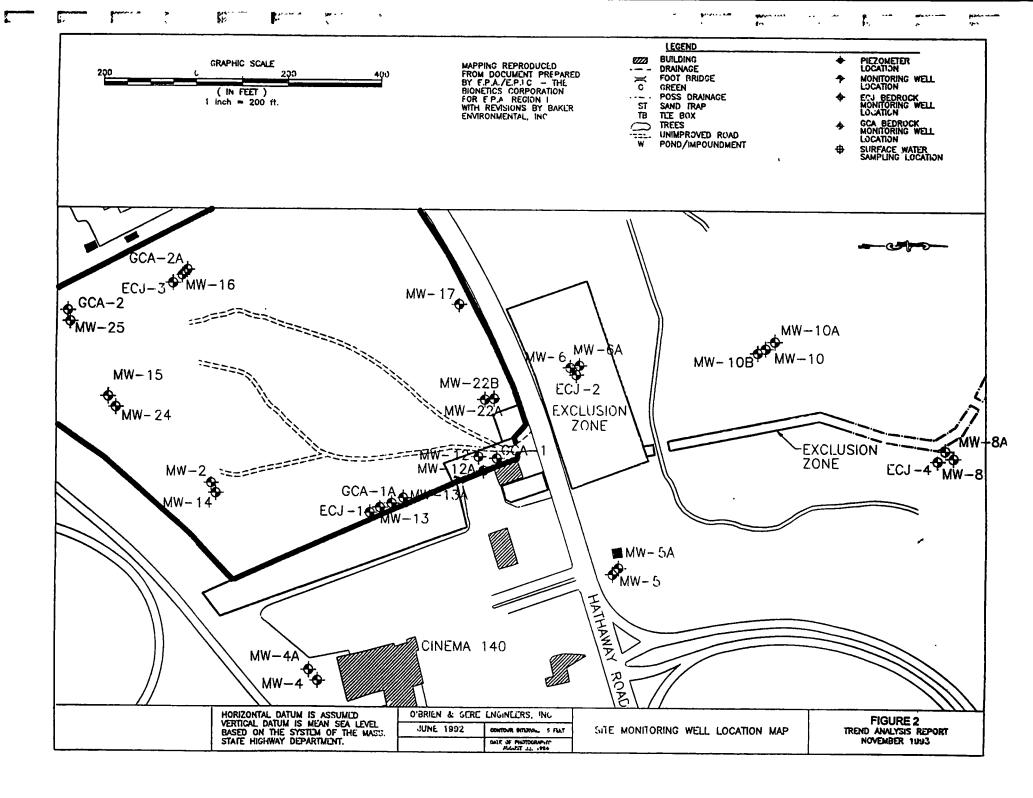


Figure 3 - Chain of Custody Record

O'Brien & Gere Laboratories, Inc. 5000 Brittonfield Parkway **Chain of Custody** East Syracuse, New York 13057 (315) 437-0200 Client: Analysis/Method Project: Sampled by: **Client Contact:** Phone # Sample Description Date Time Sample Sample Location Comp. No. of Collected Collected Matrix or Grab Containers Comments Relinquished by: Date: Time: Received by: Date: Time: Relinquished by: Date: Time: Received by: Date: Time: Relinquished by: Date: Time: Received by Lab: Date: Time: Shipment Method: Airbill Number:

Turnaround Time Required: Routine	Comments:
Rush (Specify)	

Cooler Temperature:

Appendix B

Qualitative Well Integrity Testing Sullivan's Ledge Superfund Site New Bedford, MA

Well ID	Depth to	Water (ft)	Depth	to Well (ft)	Well	
	PVC	Casing	PVC	Casing	Stick-up (ft)	Notes and Comments
GCA-1	N/A	6.80	N/A	8.24	1.90	No PVC
MW-13	N/A	12.02	N/A	57.05	2.90	No PVC
MW-2	N/A	16.45	N/A	112.80	6 20	No PVC
MW-24	N/A	19.46	N/A	109 50	5.00	No PVC
MW-4	N/A	8.51	N/A	104.75	2.70	No PVC
MW-5	N/A	7.70	N/A	104.90	2.60	No PVC
MW-6	N/A	4.28	N/A	104.00	3.00	No PVC
MW-8	N/A	5.55	N/A	70.22	2 00	No PVC
MW-10B	N/A	2 07	N/A	29.60	*	
MW-12	N/A	Ń/A	13.88	14.17	1.80	No PVC. Well not sampled due to excess surface water surrounding well location.
MW-12A	N/A	N/A	N/A	N/A		No DTW measurement taken. Installed bladder pump prevents measurement.
MW-17					1.90	Tubing in well could not be removed No measurements or samples taken.
Note: 4 D II	N/A	N/A	N/A	N/A	3.50	LNAPL in well. Estimated product thickness = 1.25 ft.

Notes: 1. Depths to water (casing) for MW-10, and MW-10A were calculated by taking the sum of the corresponding depth to water (PVC) and the Casing/PVC difference.

2. Well stick-up measurements were taken on 2/9/99.

3. * = area flooded. No measurements were possible.

Welf ID	Depth to	Water (it)	Depth	o Well (ft)	Well	
	BVC.	Casing	PVC	Casing	Slick-up (ft)	Notes and Communits
MW-10	N/A	2.07	N/A	95.12	*	Well not sampled due to excess surface water surrounding well location.
VIW-10A	4.43	4.53	14.60	14.70	*	Well not sampled due to excess surface water surrounding well location.
VIW-13A	11.90	12.05	26.23	26.38	2 60	The state of the s
VIW-14	16 49	16.66	26.68	26 85	4.80	
VIW-15	19.15	19 31	28.32	28.48	4.80	
/W-16	17.65	17.73	33.70	33.78	3.00	
/W-22A	8 30	9.14	17.77	18.61	2 20	
/W-4A	8.28	8.68	17.50	17.90	2.30	
/IW-5A	6.90	7.35	17.60	18 05	2.00	
/IW-6A	4.00	5.70	19.30	21.00	3.50	
/W-8A	7.10	7.18	18.00	18.08	2.30	

Notes:

- 1. Depth to water (casing) readings were calculated by taking the sum of the corresponding depth to water (PVC) and the Casing/PVC difference
- 2. Well stick-up data for MW-13A, and MW-6A collected on 10/25/99. All other well stick-up measurements were taken on 2/9/99
- 3. * = area flooded. No measurements were possible.
- 4 Well integrity data from 1999 was compared to historical well information to determine if wells have shifted or sedimentation has occurred. A discussion of this comparison is provided in Section 2.1 of this report.

Appendix C

O'Brien &							LOW	Flow Gro	ound Water	r Samplina	Lon
Site Name	Sullivens Ledge			-	rsonnel	14	d no	ک Weath	er 5000		
Site Location	be S. a.		-s ledge	298	Evacuation Method		d <u>lon</u>	flow 66	MHS Weather 50° 5500 Solder Well# may 17		
- GERTON W				WA	Sar	mpling Method	low	1262 66	Like Prings	# <u>5505</u>	17_
Well Information	:		·						- Floject	<u> </u>	.000
Depth of Well *			_		ft		* 14				
Depth to Water *			₩_	not	tikent		Measu	rements taken	_		
ength of Water C	olumn		_		ft.				Top of Well C		
									Other, Specif	tive Casing (v)	
Vater parameters	:		Lower s	ubmersib	le pump slowly	through stagn:	ant water columi			,,	
								n ing rate of 0.5 (iters/minute		
Elapsed			Depth	eaurigs	at every three n	ninute intervals					
Time		*	To Water		_	1	ĺ	Oxidation Reduction	Dissolved]	
0			vater		Temperature	pH	Conductivity	Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow
5					<u>14.32</u>		291	79.4	5.57	-	Rate (ml/s
10					14.35		251	505	5:06		
					14.25	5.75	285	57.8	4.8.3	16.3 8,77	300
15					14.22	5.74	286	107.7			
25					14.28	5.71	287	1136	3.23	9.49	-
					14.29	5.74	286		3.15	5.98	376
30					14.25	5.74	284	115.7	2.97	6.21	
35					1 4.36	5.74	288	123.2	2.23	2.91	
10					14.44	5.72	286	1244	1,76	4.22	4.00
				_		10.72	-06	126.1	1.53	4.38	
				_		 					
						 					
						 					
						<u> </u>					
											
											
er sample:	- -										
-	330						<u></u>				
cal appearance a						To	otal volume of p	urged water ren	noved:	10951	
		Color	<u>o</u> ;),				Pi	nysical appeara	nce at sampling	4.1	
a/Ema Dec		Odor	مهدو						Color	C 647	
VFree Product		4	MAP					Sheen/Free	Odor	mone	
les collected:									Frioduct	_MAP/	
iner Size			Conta	ner Type	T#	Collected	Televier				
						7	Field Filtered	Pr	eservative	Container p	Н
							<u> </u>				
1.9.40											
		/ 1	1.7 €		o~~						

Inderface probe world not 84 in well w/ equipment

O'Brien &	Gere Engineers	, Inc.			Low Flow Ground Water Sampling Log						
Date	11/18/99	<u> </u>	Persor	Personnel Weather 49° Sruny							
Site Name	Sullivan	& Ledge	_ Evacu	ation Method	bw	flowbla	 .	10000			
Site Location	SULLIVAN New BadF	ord , HF	Sampl	ing Method			ler Project # 5509.005				
Well information						- 000-					
Depth of Well •	on.		ft.		* Measun	ements taken fr	om				
Depth to Water	•	6.				CHICKE CAROLITA	Top of Well Ca	sing			
Length of Water			ft.			V	Top of Protecti	_			
ı							Other, Specify)			
Water paramet		Position pump ii	ible pump slowly the n center of screene s at every three mir	ed interval & n			ers/minute				
Elapsed Time		Depth To Water	Temperature	pH		Oxidation Reduction Potential	Dissolved Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).		
0	6.9	Viacer	13.11	6.03	1010.0	20.89	20 .399	4.54	400		
~		حسب	1			-97.3	~~				
5	6.92	2	12.84	6.03	1030.0	-110.2	5.06	1.92	400		
10	6.85	•	12.67	6.00	1033	-114.4	5.6	1.54	400		
5 10 15			12.73	6.01	1044	-118.0	5.28	1,32			
20			12.8	6.00	1040	~119.)	4.26	1.68			
25			12.79	602	1040	-121,3	33.67	1,43			
20 25 30			12,79	6.00	1040	~121.2	23,3	1.26			
35	6.85		12,75	6.00	1040	-122.0	41.81	1.17	400		
							<u></u>				
L											
l							<u> </u>				
									<u> </u>		
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			-				<u> </u>		<u> </u>		
				ļ		 					
			ļ	1		<u> </u>	 				
Water sample:	<u></u>		<u> </u>		<u>i </u>						
Time collected	• •				Total volume	of purged water	removed:	7 .	. 1		
Physical appear							arance at sampli	ng -			
,	Color	Cler	<u> </u>				Color		_		
Sheen/Free Pro	Odor oduct	mone				Sheen/F	Odor ree Product	nord	- -		
Samples collec	cted:										
Container Size											
				 7			 				
				 							
Notes:											
	me Apr b.	, 55 h	200 61	_ ,	_ 1 .	4.0					

water essenting, my esteet voc

Site Name Site Location Well information: Depth of Well * Depth to Water * Length of Water Column Water parameters: Elapsed Time	18195 Mivers en Bealson	Lower submersi Position pump is Collect readings	ft. 22 19 (Ju)ft. ft the pump slowly the conter of screene	rough stagnard interval & n	* Measure	ements taken from	m Top of Well Ca Top of Protectiv (Other, Specify	ve Casing	2		
Site Name Site Location Well information: Depth of Well * Depth to Water * Length of Water Column Water parameters: Elapsed Time	Mivars	Lower submersi Position pump is Collect readings Depth	ft. ft. ft. ft. ft. ft. ft. ft.	rough stagnard intervals	* Measure	ements taken from	m Top of Well Ca Top of Protectiv (Other, Specify	sing ve Casing	2 2		
Well information: Depth of Well * Depth to Water * Length of Water Column Water parameters: Elapsed Time	en Bealdy	Lower submersi Position pump is Collect readings Depth	ft. 2 19 (10) ft. ft ible pump slowly the center of screenes at every three min	rough stagna d interval & n oute intervals	* Measure	ements taken from	m Top of Well Ca Top of Protectiv (Other, Specify	sing ve Casing			
Well information: Depth of Well * Depth to Water * Length of Water Column Water parameters: Elapsed Time		Lower submersi Position pump is Collect readings Depth	ible pump slowly the nocenter of screenes at every three min	d interval & n aute intervals	nt water column naximum pumpir	ng rate of 0.5 lite	Top of Well Ca Top of Protecti (Other, Specify	ve Casing			
Depth of Well * Depth to Water * Length of Water Column Water parameters: Elapsed Time		Lower submersi Position pump ii Collect readings Depth	ible pump slowly the nocenter of screenes at every three min	d interval & n aute intervals	nt water column naximum pumpir	ng rate of 0.5 lite	Top of Well Ca Top of Protecti (Other, Specify	ve Casing			
Depth to Water * Length of Water Column Water parameters: Elapsed Time		Lower submersi Position pump ii Collect readings Depth	ible pump slowly the nocenter of screenes at every three min	d interval & n aute intervals	naxımum pumpii	ng rate of 0.5 lite	Top of Protecting (Other, Specify	ve Casing			
Water parameters: Elapsed Time		Position pump is Collect readings Depth To	n center of screene s at every three mir Temperature	d interval & n aute intervals	naxımum pumpii		(Other, Specify	_			
Elapsed Time		Position pump is Collect readings Depth To	n center of screene s at every three mir Temperature	d interval & n aute intervals	naxımum pumpii			•	· · · · · · · · · · · · · · · · · · ·		
Elapsed Time		Position pump is Collect readings Depth To	n center of screene s at every three mir Temperature	d interval & n aute intervals	naxımum pumpii		ers/minute	•			
Time O		Depth *	Temperature		Position pump in center of screened interval & maximum pumping rate of 0.5 liters/minute Collect readings at every three minute intervals Depth						
Time O		10									
0 5	4	tratei			Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).		
0 5 10 15 20 25 30	4		1 1 16	pH	Conductivity	Otenual	(mg/i)	(1410)	rate (mumin).		
~	7		1	863		.05	4 6 ::	2.5			
5 10 15 20 25 30			12.33	6.28	820	-138.0	6.88	25	480		
16 20 25 30			12.65	6.32	1	-140.6	10.02	21	380		
78 20 25 30	10		12.61	6.33	823	-140.7	7.56	9.9	400		
20 25 30	/}/-		12.78	6.33	823	-142.2	7.65	9.2	350		
30	/{		12.75	6.32	821	~1410	708	9.88	350		
30		 	12.82	6.34	823	-143.4	6.85	4.07			
			12.83	6,36	822	-145.3	とら	3.47	320		
	$-\mathcal{N}$		12.87	6.33	819	-146 4	5.15	2.86			
	\mathbb{Q}_{-}							·			
	$\longrightarrow \mathbb{A}$.						
								ļ			
	Δ				ļ				<u> </u>		
	$\supset \chi$					<u> </u>					
	9										
		· · · · · · · · · · · · · · · · · · ·									
Water sample:											
Time collected: 4	45				Total volume of	of purged water r		<u> 20 92</u>			
Physical appearance at s		41: 1.41	1			Physical appea	arance at sampli Color				
Odor clanted / solven + Odor organic / clanted											
Sheen/Free Product						Sheen/Fi	ree Product	20-1	-		
Samples collected:							<u> </u>				
Container Size Container Type			ег Туре	# Collected	Field Filte	red	Preservative	Contain	er pH		
				7							
									<u></u>		
Notes:											

pump cap was cut to recomment air hose 140

O'Brien &	Gere Engineers			Low F	low Grou	nd Water	Sampling L	.og	
Date	11/17/95		Persor	nnei	REH	1, nHS	Weather	440F 50	
Site Name		lorse	- Evacu	ation Method	104 5	Gan Slock		me - 2	
Site Location	ner Belge		- Sampi	ing Method		6- 61-Ro			
Well information					<u> </u>				
Depth of Well *			ft.		* Measure	ements taken fro	m		
Depth to Water *		8.3	ft.				Top of Well Ca	asing	
Length of Water	Column		ft				Top of Protecti	•	
							(Other, Specify	(1) 	
Water paramete		Position pump in	ble pump slowly the center of screens at every three min	ed interval & m			ers/minute		
		Depth	1	Take Willer Valle		Oxidation	Dissolved]	
Elapsed <u>Time</u>		To Water	Temperature	pН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
	8,70	5	14.66	7.02	940	-205	2.31	150	
5	8.75		14.62	6.53	927	-211.1	1.21	36	550
10	8.75	-	14.60	6.80	915	-2042	,94	36	
18	8.8		14.66	6.76	910	-202.8	.67	35	650
20	2.75		14.32	6.75	901	-202,6	.07	25	450
25	8.75	•	14.21	671	893	195,9	.07	20	Y25
30	8.76	<u> </u>	14.19	6.69	886.0	-195.1	.07	16	425
35			14,22	4.66	881	-192.5	.08	16	
40			14.22	6.67	884	195.0	.05	13	
48			14,20	6.64	877	~153.3	. ૦૨	12	
50			14,23	6,62	874	-181.2	.02	10	
05			14,28	661	270	-185.5	.04	8.82	
60	8.6		14,28	6.60	872	-193.3	.01	7.10	<u> </u>
45			14.22	6.58	864	-189.6	,03	7.72	
70		.	14.27	6.58	869	-185.5	3 هر	4.89	
					<u> </u>			1	
				ļ <u>.</u>					
ļ				ļ					
			<u> </u>	<u> </u>	<u>.</u>			<u> </u>	
Water sample: Time collected	1700				Total volume o	of purged water r	emoved	le a	1
Physical appeara					Total Volume C		emoved. Irance at sampli	Pull	<u> </u>
i nysical appeare	Color		<u>v </u>			·, olda. appoo	Color	• ,	_
	Odor <u>Clenica [/silvand - "skunky"</u> Odor <u>Sena</u>								
Sheen/Free Prod	Sheen/Free Product Sheen/Free Product								
Samples collect	ted:								
Container Size	т Туре	# Collected	Field Filte	red	Preservative	Contain	er pH		
							<u> </u>		
Notes: 45	lotes: 45.1 pgm on 11.7 eV OVM								

O'Brien &)'Brien & Gere Engineers, Inc.					Low Flow Ground Water Sampling Log					
Date	H1-0700	- 11/17/59	Person	nel	REH,	n1/5	Weather	40°F Su	nay		
Site Name	sullivan	's Ledge		tion Method	Low A	low hlad	er Well#	MW-12	24		
Site Location	men Bedle	ord MA,		ng Method	Cowf	lowblad	er Project #	40°F Su MW-13 5509.00	25		
Well information	n:					. '<u>'</u>' .		· · · · · · · · · · · · · · · · · · ·			
Depth of Well *			ft.		* Measure	ments taken fro	m				
Depth to Water *							Top of Well Ca	•			
Length of Water	Column	•	ft				Top of Protecti	•	i		
							(Other, Specify	') 			
Water paramete		Position pump in	ble pump slowly the center of screene at every three min	d interval & m			ers/minute				
		Depth				Oxidation	Dissolved	ŀ			
Elapsed Time		To Water	Temperature	рН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).		
O	11.9		14.12	6.15	638	1281	1.48	21	325		
5_	11.8	5	1395	6.20	644	-127.9	. 64	20	350		
16	1(.)	'	14.02	6.19	643	-134,3	.28	8.8	400		
15	11.84	<u>b</u>	14.06	6,20	644	-137.7	.23	3.7	450		
20			1411	6.21	648	-140.3	.18	2.7			
30	11.85		14.08	6.2	645	-142.8	.12	2,3	450		
30			14.03	6.2	645	-143.2	.18	2.9			
		,					*				
									-		
							<u> </u>	ļ			
									<u> </u>		
	<u> </u>		<u> </u>	<u> </u>	<u></u>		<u> </u>	1	L		
Water sample:	1315				Total volume o	of purged water i	removed	10-	_ 1		
Physical appear					70.0.1		arance at sampli	ina			
.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Color	clear	<u> </u>			•	Color		_		
	Odor	mone	•				Odor	Orsen	[]		
Sheen/Free Prod	Sheen/Free Product Sheen/Free Product Sheen/Free Product										
Samples collec	ted:										
				# Collected	Field Fitte	ered	Preservative	Contain	er pH		
				 .							
							 				
Notes:	lates.										

O'Brien &	Gere Engineers, I	nc.			Low F	Low Flow Ground Water Sampling Log				
Date .	11/17/99		Person	nel	Method 100 Flow blocker Well# Man 13					
Site Name	ren Roddon	edel	Evacua	ition Method	low	Flow bles	fla Well#	mu-1	3	
Site Location	ne Rellore	<u>e ka</u>	Sampli	ng Method	Con Flow bladle Project # 5505.065					
Well informatio	n:						<u> </u>			
Depth of Well *			ft.		* Measure	ements taken fro	l			
Depth to Water 1		12.0				V	Top of Well Ca	-		
Length of Water	Column		ft ft				Top of Protection (Other, Specify	-		
Water paramete	Po	sition pump in	ole pump slowly the center of screene at every three min	d interval & n			ers/minute			
	De	pth				Oxidation	Dissolved			
Elapsed Time	To W	ater	Temperature	рH	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).	
0	12.03		12.68	6.32	631	-143.3	.55	1.4	600	
<u>~</u>	12.02		12.68	6.33	631	-1570.9	1.08	1.2	650	
10	12-03		12.86	6.32	634	-1541	<i>-</i> 32	1.5	රවට	
15	12.03		12.80	6,31	633	-156.4	. 39	1. [
20	12.03		12.83	6.32	634	-156.7	. 20	1. 2		
25	12.03		1289	6,29	635	-1580	.19	1.2		
30	12.03		12.85	6.29	635	-1614	-11	1.3		
36	12.03		12.9	6.28	636	-162.0	.14	1.2		
						<u> </u>				
						<u> </u>			<u> </u>	
				<u>.</u>						
						ļ ,				
				<u> </u>		<u> </u>			<u> </u>	
Water sample: Time collected: Physical appear Sheen/Free Pro	rance at start Color C Odor	none			Total volume		arance at sampl	clear	<u>. </u>	
Samples collect	cted:									
Container Size		Containe	г Туре	# Collected	Field Filt	ered	Preservative	Contai	ner pH	
				10						
							<u> </u>			
Notes:										
2 rd netroels cleck FART/unfilter										

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O'Brien &	Brien & Gere Engineers, Inc.					Low Flow Ground Water Sampling Log				
Date	11/17/55		Perso	nnel	REH Weather 35°F Sunny					
Site Name	_ Lulliusn's	Ledge	Evacu	ation Method		Story black	- br Well#	mw-6		
Site Location	non BedSo	res MA	Samp	ling Method				6808,0	00	
Well information	on:									
Depth of Well *			ft.		* Measur	ements taken fro	om			
Depth to Water	•	4.28	ft ft				Top of Well Ca	sing		
Length of Water	Column		ft				Top of Protecti	ve Casıng		
						L	Other, Specify	')		
Water paramete	F	ower submersible pur Position pump in cente Collect readings at ever	r of screen	ed interval & n	naxımum pumpi	ng rate of 0 5 lite	ers/minute			
	i	Depth	ry three mi	nute intervais		Oxidation	Dissolved	Γ		
Elapsed Time		To Vater Temp	perature	рН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).	
0	4,3)	(1),	25	6.64	E \$3	-148/6	4.03	12	550	
5_	4,41		34	6,67	638	-15-21	1.49	8.5	660	
10	4.44	11,	42	6.67	635	-162.4	-98	8,2		
15	4. 44	ft.	47	6.67	636	-164.8	.28	8.4	680	
20	4.45	VI,	40	6,67	636	-1675	,17	8.0		
25	4, 46	11.5	15	83.2	636	-120,0	,29	10	000	
30	4.46	11.0		6,67	636	-170.6	.11	8,2	+ , , ,	
						- 0, 0	<u> </u>	0/2		
					_					
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				<u> </u>	-					
			·					7		
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				<u> </u>						
	<u> </u>									
				<u> </u>						
					I					
Water sample:	<i>-</i> :							•		
Time collected:	66				Total volume of	f purged water i	removed.	<u> 799</u>		
Physical appeara	*****					Physical appea	arance at sampli	ng		
	Color Odor						Color		_	
Sheen/Free Prod	Odor Odor neen/Free Product Sheen/Free Product									
Samples collect	Imples collected:									
Samples collect Container Size		Container Type		# Collected	Field Filte	red	Preservative	Contai	ner pH	
8										
										
			· -	<u> </u>			l			
Notes: 1,3	gon on	17eV OV	m							

O'Brien &	'Brien & Gere Engineers, Inc.					Low Flow Ground Water Sampling Log					
Date	11/16/55		Persor	nnel	REIX	mas	Weather	40°F 64	uly		
Site Name	Sulliven's Les	les	Evacua	ation Method				ma_6			
Site Location	Sulliver's Lon	ent	- Sampl	ing Method				00,7083			
							-γ				
Well information			_								
Depth of Well *			ft.		* Measure	ements taken fro					
Depth to Water		<u> </u>	. <u>O</u> ft.				Top of Well Ca	=			
Length of Wate	r Column		ft				Top of Protecti	•			
						<u> </u>	Other, Specify	···			
Water paramet		Position pump in	ble pump slowly the	ed interval & r			ers/minute				
		Depth	at every three mir	lute intervals	1	Oxidation	Dissolved	<u> </u>			
Elapsed		To				Reduction	Oxygen	Turbidity	Flow		
Time		Water	Temperature	pH	Conductivity		(mg/l)	(NTU)	Rate (ml/min).		
0_	3.9		10.63	6.27	.726	-75.5	22.3	8.5	450		
<u> </u>	3.8		11.61	6.3	,733	-79.1	19,00	<u>2.5</u>	450		
10	7.82		11.58	63	,746	-81.5	2668	3.47			
15	3.82		11.86	6,29	- 725	-84.3	34.55	2.64	450		
20			13.11	6.28	326	-85,4	34.18	7.48			
28			11,99	6.28	.786	-86.3	27.16	2.44			
} <u>*</u>	 		11.77	6.29	,75%	- 86.6	36.0	1.62			
								1.0			
						 	<u> </u>		-		
					<u> </u>	-					
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			_	 		-	 	 			
Water sample:			<u> </u>	<u> </u>	1	<u> 1 </u>	1	J	<u> </u>		
Time collected					Total volume	of purged water	removed.				
Physical appea							arance at sampli	na			
i nysicai appea	Color					i iiyolaal appo	Color	•			
	Odor						Odor		_		
Sheen/Free Pro	oduct					Sheen/F	ree Product		_		
<u> </u>											
Samples colle Container Size	г Туре	# Collected	Field Filte	ered	Preservative	Contair	ner pH				
					1 10.0 1 11.0			00			
				<u> </u>			<u> </u>				
Notes:											

O'Brien &	Gere Engineer	Low Flow Ground Water Sampling Log									
Date .	11/14/99		Person	nel	REL	LOW Play Ballar Well# MW - 85 SA Low Flow Blallar Project # 5505, 005					
Site Name	Julliven's	Ledge	-	ation Method	Low	Par Black	# Well	Mu - 8	SA		
Site Location	nen Bed	Sone mA	Sampli	ng Method	low F	low Black	Project #	5505,00	2		
Well informatio	n:										
Depth of Well *			# 6,5 ft.	<i>*</i>	* Measure	ements taken fro	1				
Depth to Water *			<u>₩ 6.5</u> ft	•			Top of Well Ca				
Length of Water	Column		ft.				Top of Protecti	-			
							(Other, Specify	') 	 		
Water paramete	ers:	Position pump in	ble pump slowly the center of screene at every three mir	d interval & n			ers/minute				
		Depth				Oxidation	Dissolved		l <u>.</u>		
Elapsed Time		To Water	Temperature	pН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).		
0	7.35		13.81	6.5	1.427	165.7	5.44	16.7	525		
5	73		17,73	55	1.43	172.2	7.84	9.04	370		
10	7.3		13.86	5.5	1,437	174.3	9.95	5.25	Y00		
15	7.3		13.94	5.00	1.397	1777	10,35	4.14	400		
20	7.3		13,88	5.5	1.399	178.4	10.37	2.29			
25			13.81	8.5	1.352	182.3	5.81	2.07	370		
30	7.3		13.88	6.51	1.398	180.4	5.39	1.84			
				 		·					
						<u> </u>					
		-									
									<u> </u>		
Water sample:									,		
Time collected:					Total volume	of purged water		6 92	/		
Physical appear	ance at start Colo	r clrebta	nistu			Physical appea	arance at sampl Color				
	Odo						Odor		- -		
Sheen/Free Pro	duct	mal				Sheen/F	ree Product	none	_		
Samples collec	:ted:					······		<u>-</u> -			
Container Size		Containe	г Туре	# Collected	Field Filte	ered	Preservative	Contair	ner pH		
				 							
		1			- 		<u> </u>				
ms /:	25.0	1									
Notes:	-										
۷۰٬۱۱	Leiko	E.IJer	1 un &1	b^	242	mester 0	cho-	L			

even though Turb is low

O'Brien &	Gere Engineers, Inc.		Low Flow Ground Water Sampling Log							
Date	11/16/88	Person	nel	R 510	CHIFS	Weather	47°F 50.			
Site Name	Sullivers ledge	Evacua	ation Method	160	F64 34	# Well	<u> </u>	·		
Site Location	new Ballord MA	Sampli	ng Method	You 8	How 5 hole	Project #	2507.60	5		
Well Informatio	n:						, 			
Depth of Well *		ft.		* Measure	ements taken fro	m I				
Depth to Water 1						Top of Well Ca	-			
Length of Water	Column	ft			$-\nu$	Top of Protection (Other, Specify	_			
							, 	·		
Water paramete	Position pump in	ole pump slowly the center of screene at every three min	d interval & m			ers/minute				
	Depth	•			Oxidation	Dissolved				
Elapsed Time	To Water	Temperature	pН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).		
0	8.03	13.13	7.2	1.035	15.2	4.46	10,7/			
6	8.20	(3,(3	7.19	1.046	15.0	3.94	7.41	325		
10	8.40	13.13	7.19	1.046	9.9	3.95	5.84	350		
15	<u>පි.20</u>	13.14	7.21	1941	8.2	4.43	6.34	3 25		
20	8.9	13.15	7.19	1.046	5.0	5.26	6.36	325		
\otimes	60 stsle @ 9.1 X			ļ						
	no draudosery, no reduce									
25	۲,2	13.22	7.2	1.047	.9	4,53	5.65	300		
30	9.4	13.12	7.21	1.045	9	4.09	5.76	ე ე		
36	9. 43	13.00	7,23	1.040	S	12.38	5.36	200		
40	ዓ. 46	13.00	7,22	1.032	~ 8	12.46	4.36	250		
	, , , , , , , , , , , , , , , , , , ,									
·										
Water sample:	1248				_					
Time collected:	ance at start			Total volume o	f purged water r					
Physical appear	ance at start Color				Physical appea	rance at sampli	ng 			
	Odor							•		
Sheen/Free Prod	duct				Sheen/Fr	ee Product				
Samples collec	Samulae estlested:									
Container Size Container Type #				Field Filte	red	Preservative	Containe	er pH		
										
D-0-	2									
Notes:										
110(63.				-:						

O'Brien & Gere Engineers, Inc.					Low Flow Ground Water Sampling Log				
O.Rueu «		s, mc.		. 					
Date	11/12/55		Persor	nnei	REH		_ Weather	<u> 33°r</u>	14 pertly sommy
Site Name	Sullivani	s Ledge	Evacu	ation Method		blulder	Well #	mw-	14 7
Site Location	nen. Beds	ions, MA	Sampl	ing Method	low	Plan b hall			1.005
Well information	on:							· · · · · · · · · · · · · · · · · · ·	
Depth of Well *			ft.		* Measure	ements taken fro	om		
Depth to Water	•	16.	45ft			V	Top of Well Ca	sing	
Length of Water	Column		ft				Top of Protecti	ve Casing	
							Other, Specify)	
Water paramete	ers:	Position pump in	ble pump slowly the center of screene at every three mir	ed interval & m			ers/minute		
Elapsed		Depth To			*	Oxidation Reduction	Dissolved Oxygen	Turbidity	Flow
Time O	1/ 5-1	Water	Temperature	pH	Conductivity	Potential	(mg/l)	(NTU)	Rate (ml/min).
	16.5		12.86	6.54	103163	-155.9	1,86	1.47	450
8	16.54		13.24	6.56	103585	1	1.58	.50	
16	16.55		13.28	6.58	103572	-160,6	1.64	.75	480
15			13.25	6.55	103242	-158.6	1.54	.53	
20	16.5-3		13.41	6.55	103318	-161,1	1.66	4.14	450
25			13.11	6.53	102455	-160 8	1.65	1.25	450
30	16.53		12.92	6.52	101729	-154.4	1.74	_	
35	16.51		13.12	6,47	102351	٦, ١٤١٠	2.12	,73	450
40			13.35	6.49	102850	-151.6	2.14	1.08	
		*							
	İ								
	· · · · · · · · · · · · · · · · · · ·					<u></u>			
						<u> </u>			
						-			
· · · · · · · · · · · · · · · · · · ·						<u> </u>			
ļ. 					<u></u>			<u> </u>	
									
Water sample:				L		i			
Time collected:	1				Total volume o	f purged water i	removed:	109	<u>«</u> 1
Physical appear					Total Volume o	. •	arance at sampli	•	
i nyoloti oppoui	Color	A.S. PRISON				i ilysical appea	Color	•	
	Odor		·				Odor		
Sheen/Free Product Sheen/Free Product									
Samples collec	:ted:								
Container Size Container Type			# Collected	Field Filte	red	Preservative	Co	ntainer pH	
			3	\- <u>-</u>	-				
Dup - 1	-25-1	Pc 1 /c : 21	1100 1 1	7			Hnon		
40-1					1401				
Notes:	lotes: 4.9 pm - 11.7 eV OVM								

to cond. could not be calibrated properly. Readings are high will still unit for stillizedlar.

O'Brien &	Gere Engineers, Inc.			Low F	low Grou	ınd Water	Sampling L	.og
Date	11/11/95	Perso	nnel		4 NHZ	Weather	35°F CH	such / persh
Site Name	Sillivans cedice	Evacu	ation Method		864 blue	€ Well#	-w-1	6
Site Location	ner Bed Sord in	1 A Samp	ling Method		slow blad	_	6509.6	
Well Informatio	n:							
Depth of Well *		ft		* Measur	ements taken fr	rom		
Depth to Water *	<u></u>	17.65 A.			V	Top of Well Ca	ısing	
Length of Water	Column	ft				Top of Protecti		
						(Other, Specify	')	
Water paramete	Position p	omersible pump slowly the ump in center of screen adings at every three mi	ed interval & n	nt water column naximum pumpi	ng rate of 0,5 lit	ters/minute		
	Depth	adings at every times in	ide intervais		Oxidation	Dissolved	Τ —	1
Elapsed	To	_			Reduction	Oxygen	Turbidity	Flow
Time_	Water	Temperature	pH	Conductivity	Potential	(mg/l)	(NTU)	Rate (ml/min).
	17.71	12.17	5.74	1532	83.1	4.55	17.2	
5-	V7.72	13,44	5.66	1533	114,2	.77	4.92	300
16	17,73	13.08	5.59	1513	121.9	1.07	2.75	275
<u> </u>	17.73	1296	5.67	1208	126.2	1.06	1,75	275
20	17,72	13.27	5,64	1516	128.6	1.12	1.31	275
25	17.73	13.34	5.65	1515	128.8	1.15	1.18	275
3/2	17.73	13.34	5.67	1575	128.1	0.91	1.51	275
							-	
Frel		13.16	5.62	15020	1210	1.04		
						 		
	· · · · · · · · · · · · · · · · · · ·							
						 	ļ	
						 		
Water sample:						<u></u> _		
Time collected _	13:45			Total volume of	f purged water r	removed.	5 9:1	
Physical appeara	aconamico o	/ 0			Physical appea	arance at samplin	ig ,	
	Color 51/54	thy aloudy				Color	CEEAR	
Sheen/Free Prode		<u> </u>			Sheen/Fi	Odor _ ree Product	mone	
Samples collecte	ed:							
Container Size Container Type		/ -	# Collected	Field Filter	ed	Preservative	Containe	r pH
1/2 he	10c/PCB C	Ce.55	43			1//		
11.	2515	IDA	<u> </u>	- - 	-	#403		· · · · · · · · · · · · · · · · · · ·
						MC-1-		
Notes					_			

O'Brien & Gere Engineers, Inc. Low Flow Ground Water Sampling Log								00	
	111115		Persor	nol		MIS	Monthe	ر المالية على المالية على المالية المالية المالية المالية المالية المالية المالية المالية المالية المالية الم	of Joseph
Date .		- (0	•	ation Method		for Skeld	i		
Site Name	new Bostone	ectso.	•	ing Method	100-2	100 Date	Vveii#	MU-21	1 REH
Site Location		JVYA	Sampi	ing Metriod	110-0	WO ONO	Project #	5505.00	3 115 11
Well informatio									
Depth of Well *		\	ft		* Measure	ements taken fro	1		
Depth to Water 1		19.					Top of Well Ca	•	
Length of Water	Column		ft.				Top of Protectr (Other, Specify	-	
							1(,	
Water paramete			ble pump slowly the center of screene				ere/minute		
			at every three mir			ing rate or old inte			
		epth				Oxidation	Dissolved		
Elapsed Time		'o Vater	Temperature	рН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).
0_	19.46		10.85	16.55	1300	-132.0	1.64	56.0	375
5	20,70		10.59	1.66	1294	-153	.8.3	39,4	400
10	19.8		11.00	6.65	1279	-1495	1.34	38.7	375
15	20.00		11.05	6.62	1249	- 152. 0	1.08	20.2	400
20	19.5		10.98	6.64	1216	-151.0	1,26	37.4	250
25	19.82		10.43	6.59	1196	-147.5	1.43	35.0	250
36	15,80		10.62	6.54	1195	-147.0	1.52	39 7	275
35					1183	-147.1	1.49		
	19.80		10.70	6.66	1175	 	 	39.1	400
40			10.53	6.65		- 145.3	1.88	57.8	275
45	15.75		10.43	6.66	1173	-141.3	2.37	64.2	300
						<u> </u>			
	000		9 4 5	(10	14110	~) \$60	210		
Final	15.85		9,28	6,62	1142	-138	2,68		
				 					
	<u> </u>				<u> </u>	-	 		
	-			<u> </u>			<u> </u>		
				-					
		 -		-					
					<u> </u>		<u> </u>		<u> </u>
Water sample:			<u> </u>	<u> </u>	<u> </u>		<u> </u>		<u></u>
Time collected:	10:30				Total volume of	of purged water r	emoved:	10 ac	1
Physical appear						,	rance at sampli		
	Color	roddy/c	loudy			, ,,,,,,	Color	cless	_
Odor <u>solvent</u>									
Sheen/Free Product Sheen/Free Product									
Samples collec	ted:								
Container Size Container Type			# Collected	Field Filte	red	Preservative	Contain	ar pH	
116	SVOC/PCB	<u> </u>	.	 		-			
	etals	<u> </u>		+	ye.	5/4	Hnoz		
40 Al VOA				 3 _		<u>-</u>	HC1		
	<u> </u>			L					
Notes:									

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O'Brien & Gere Engineers, Inc. Low Flow Ground Water Sampling Log							Log				
Date	11/10/99		Persor	nnel	REH.P	(5 ! NH5	Weather	Sunny 69	<u>°</u> c		
Site Name	Sullivens	udse	Evacu	ation Method	Low-Fr	ow BLOODER		MW-15			
i Site Location		em BED sone	Sampl	ing Method	d Low- From Burnson Project # 5509.005						
Well informat	ion:				<u></u>						
Depth of Well			ft.	,	* Measure	ements taken fro	<u>o</u> m				
Depth to Wate	r* 19.	15 (AL) 16.38	(Prc) ft. RE	Ħ			Top of Well Ca	sing			
Length of Water	er Column .		ft				Top of Protecti	•			
							(Other, Specify	')			
Water parame	eters:		ble pump slowly th								
			center of screene at every three mir		naximum pumpi	ng rate of 0.5 lite	ers/minute				
	T	Depth				Oxidation	Dissolved				
Elapsed Time		To Water	Temperature	pН	Conductivity	Reduction Potential	Oxygen	Turbidity (NTU)	Flow		
O	19.2		16.33	6.11	321	~ 40.8	(mg/l)	.66	Rate (ml/min).		
5	111111111111111111111111111111111111111		16.51	6.13	519	-30	464	100	760		
10	15.2	K	16.25	6.10	513	- 352	1,43	1.04	361		
15	1.7.2	<u> </u>	16.18	6.10	510	- 36.8	1.41	75~	1-201		
	19.25	`	16.20	6.10	208	- 36.6	1.46				
20	17.6	<u>, </u>				-27.5		1.03	 		
			16.15	6.13	505	 	217	.76			
30	15.26	<u> </u>	16.14	6.12	504	-22.	2.21	.74			
		··									
				ļ							
			<u></u>	l		1.					
							 		<u> </u>		
<u> </u>		-		 							
<u> </u>				 				-			
			<u> </u>					 	 		
Water sample	<u> </u>		<u> </u>	<u> </u>	<u> </u>			<u> </u>	_ 		
Time collected	1300				Total volume of	of purged water i	removed	5 gal			
Physical appea	arance at start					Physical appea	arance at sampli				
		clear					Color		_		
0b		Nor.				Ob (F	Odor		_		
Sheen/Free Pr	oduct	None				Sneen/F	ree Product	None			
Samples colle											
Container Size		Container	Туре	# Collected	Field Filte	ered	Preservative	Contai	ner pH		
IL - SUOC /PCB GLASS FIL - NOTALS PE				1	= 11110						
40 ml VOA				3			HUOZ				
Notes:											

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O'Brien &	Gere Engineers, Inc.		Low Flow Ground Water Sampling Log								
Date _	11/10/95	Person	inel	LEH	PCS NS	Weather	Cloudy 61	00F			
Site Name _	Sulliven's Ledge	Evacua	ation Method	low ste	w bholder	<u>·</u> Well #	2 The-	24			
Site Location _	ner Bedford	Sampli	ng Method	Low 86	w bholder						
Well information	1:										
Depth of Well *		ft		* Measure	ements taken fro	<u>o</u> m					
Depth to Water *		19.00 A				Top of Well Casing					
Length of Water (Column	ft.				Top of Protecti	_				
						Other, Specify)				
Water paramete	Position p	omersible pump slowly the nump in center of screene adings at every three min	d interval & m			ers/minute					
	Depth				Oxidation	Dissolved					
Elapsed Time	To Water	Temperature	рН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).			
0	,9 44	13.6	5.8	323		1-51	orscile	140 60			
				316	100	1.79	208 su 10	195			
5	-0.115	15.07	5.68		161.5		28 sce 16				
10	19.47	16.02	5.76	325	189,0	2.96		35.0			
15	16 40	1454	5.75	319	161,4	2.13	obs scok	200			
20	19.47	13.85	5.73	312	139	2.73	0 8 sc2 10	600			
25		13.57	5.73	307	159	2.95	Off ser le	4.20			
30	15, 47	1598	5.92	336	64	.31	6St 5006	vois low			
35	19,47	16,13	2.58	343	31.8	.31	98 rca10	50 %			
					<u> </u>			4			
			<u> </u>			1					
		<u></u>	()			(2)	Ĺ	-			
				0	C) A	1				
		$d\mathcal{O}$	1		1,70						
		XW . K	e		(
		N.		20 0)						
	<u> </u>	47/	<i>v</i> .	201		`					
	/	7	- X	U. Ya.							
	·			7							
			0/	-							
Water sample:		(0	5//		<u> </u>						
Time collected:		- (e		Total volume o	of purged water	removed.					
Physical appeara	ance at start		/		Physical appea	arance at sampli	•				
	Color							-			
Odor Odor Sheen/Free Product Sheen/Free Product											
Sheen/Free Prod					JIEEN/F	ree Floutet					
Samples collect			•								
Container Size	Co	ntainer Type	# Collected	Field Filte	red	Preservative	Contain	er pH			
				- / -		-					
						†··					
Notes:					<u></u>						



O'Brien &	Gere Engineers	, inc.	Low Flow Ground Water Sampling Log								
Date	11/12/99		Persor	nnel		Y NHS		35°F 500			
Site Name	Sullivens 4	de 1	Evacua	ation Method		lor blalle		mw-2			
Site Location		d ma	Sampl	ing Method		low 5 holder					
Well information	n:						<u> </u>				
Depth of Well *			ft.		* Measure	ments taken fro	<u>m</u>				
Depth to Water *	•	16,4	45 ft.			Top of Well Casing					
Length of Water	Column		ft			<u> </u>	Top of Protectr	_	:		
							Other, Specify	')			
Water paramete		Position pump in	ble pump slowly the center of screene at every three mir	ed interval & m			ers/minute				
		Depth	at every arree sum	ide intervais	N	Oxidation	Dissolved				
Elapsed Time		To Water	Temperature	pН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).		
0	16.54		12.57	6.29	62155	-5.7	3.14	14.9	120		
<u> </u>	16.50		13.11	6.25	63244	4.5	4,24	10.32	100		
10	16.53		12.81	6.30	62316	27.1	3,52	20.6	350		
15	14.45		12.22	6.29	61221	32	2.56	61.0	400		
20	16.45		12.4	6.31	61187	17.0	2.35	34.4	380		
26	16.70		12.15	6.33	60537	15	2,25	52.3	400		
30	16.7		12.21	6.33	60243	-11.9	2.07	966	400		
	11.7		12.14	638	59671	-22.4	1.99	104.8	320		
				ı							
			i i								
							<u> </u>				
	<u></u>										
				<u> </u>					<u> </u>		
Water sample:	17 = 0										
Time collected: Physical appears	1230				i otal volume o	f purged water r		-> 9=1-	_		
Pnysical appeara	ance at start Color					Pnysical appea	arance at sampli Color	_			
	Odor										
Sheen/Free Prod	duct	•	···			Sheen/Fr	ree Product		-		
Samples collec	ted:			T	7						
Container Size	SVOC / PCD	Container		# Collected	Field Filte	red	Preservative	Containe	er pH		
1 1	medal	د	3	ر کھر		11-0					
40 ~	VOC		3			H503	·				
							77				
Notes:											

the could not be calibrated property. Ready too Wh. Will can't to stablised

O'Brien &	Gere Engineers	, Inc.		Low Flow Ground Water Sampling Log						
Date		1/12/55	Person	nel	REM	10HS	Weather	377 sm	านู	
Site Name		Ledge	Evacua	ation Method		ion bladla		MW-8		
Site Location		l, nh	- Sampli	ing Method		How block		5601,00		
			•							
Well Informatio	n:				* 14					
Depth of Well *		5.4	14 ft.		- Measure	ements taken from		-1		
Depth to Water		0.7	ft.				Top of Well Ca Top of Protecti			
Length of Water	Column		n.				(Other, Specify	_		
		<u> </u>								
Water paramete	ers:		ble pump slowly th a center of screene				rs/minute			
			at every three min	ute intervals	,	10.11.11	Discolated	т	,	
Elapsed		Depth To		1		Oxidation Reduction	Dissolved Oxygen	Turbidity	Flow	
Time		Water	Temperature	pH	Conductivity	Potential	(mg/l)	(NTU)	Rate (ml/min).	
0	6.47		12.01	6.7	856	-155.7	1.46	of sule	350	
	Eng	High	8low -4	Mous 5	08 5	edrent				
		212	مهار ورا	ned						
0	5.50	-	11.84	6.79	914	-1724	1.15	73.5	428	
5	6.47		11.56	6.96	916	-180.1	.87	<u>چې.</u> ۲		
10	5.46		11.85	6.8	910	-1728	1.06	48.2	450	
1.0	<i>j</i>						1.00	100	100 _	
			Pen o	ه جن	18 n. a	rose			· · · · · · · · · · · · · · · · · · ·	
								 		
				ļ	ļ				_	
						ļ				
<u> </u>								<u> </u>		
				 						
		· · · · · ·	 	 	 	 		<u> </u>		
Water sample:	<u> </u>		<u> </u>	<u></u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	1	
Time collected:					Total volume	of purged water re	emoved			
Physical appear	ance at start						rance at sample	ing		
, .,,	Color	c Good				, , , , , ,	Color	-	_	
	Odor	none							_	
Sheen/Free Pro	duct	<u>nonl</u>				Sheen/Fr	ee Product		_	
Samples collec	:ted:	· · · · · · · · · · · · · · · · · · ·								
Container Size		Containe	г Туре	# Collected	Field Filte	ered	Preservative	Contain	er pH	
				 						
				<u> </u>						
		1		<u> </u>			<u> </u>			
Notes:										

O'Brien &	Gere Engineers	. Inc.			Low Flow Ground Water Sampling Log					
		113795	Person	nol		, n 45				
Date	Sullive 'S		•	ation Method				34'F 50-		
Site Name		2 mA	•	-	1000	h land		mw-8		
Site Location	ner Bedfor	7	. Sampli	ng Method	المعالا	امر مرور	Project#	<u> </u>	002	
Well informatio	n:									
Depth of Well *			ft.		* Measure	ments taken fro				
Depth to Water 1		_ 5.5	ft				Top of Well Ca	-		
Length of Water	Column		ft ft				Top of Protection (Other, Specify	-		
Water paramete		Position pump in	ble pump slowly the center of screene at every three min	d interval & m			rs/minute			
		Depth	activity throo man	Oto intervalo	ms/cm	Oxidation	Dissolved	**		
Elapsed Time		To Water	Temperature	рH	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).	
0	5.56		11.93	6.50		-1781	1.56		350	
6	5.56		,2,1	6,57		-192.5	2.2		380	
10	5.56		11.74	6.88	908	-1720	2.74		400	
15	5.56	· · · · · · · · · · · · · · · · · · ·	11.22	6.83		-165.6	3.81		3700	
20			11.86	6.78	, ४१९	-157.5	3.34		300	
25			11.98	6,75	.500	-151.0	3.24	60+1	200	
30			12.01	6.12	.816	-145.2	3,5	92,911	250	
35	5.6		12.06	6,72	.889	-142.2	2,47		275	
			·						_	
		·						<u> </u>		
	<u> </u>									
10/4	<u> </u>		<u> </u>	<u></u>		1		<u> </u>		
Water sample: Time collected: Physical appear			eloude		Total volume of	of purged water r	emoved: irance at sampli	na S g	<u> </u>	
	Color Slightly Color was cloudy Odor none Odor none									
Sheen/Free Prod	duct .	-onl				Sheen/Fr	ee Product	none	-	
Samples collec	ted:									
Container Size Container Type				# Collected	Field Filte	ered	Preservative	Contain	er pH	
40 51	SUCL PCD	UOA		1 -2 -			He1			
1 4	metal	gla.	•	2	ves/no		Hyo	_		
						<u> </u>		-		

O'Brien &	Gere Engineers	, Inc.			Low Flow Ground Water Sampling Log						
Date		15/59	Person	nel	REA	1. n HS	Weather	300F pert	clourly		
Site Name	Sullium's	Lacke	Evacua	tion Method		on 5 ledel	دہ Well#	30°F pert	A		
Site Location	new BedSord		Sampli	ng Method			Le Project#	3505.0	200		
Well information Depth of Well*	n:		fr		* Measure	ements taken fro	m				
Depth to Water '	•	7.1	REH			V	Top of Well Ca	sing			
Length of Water			ft				Top of Protectiv	ve Casıng			
_						L	(Other, Specify)			
Water paramete	ers:	Position pump in	ble pump slowly the center of screene at every three min	d interval & m			ers/minute				
		Depth		0.00 11.00 10.00	n-5/cm	Oxidation	Dissolved	€ ₩			
Elapsed Time		To Water	Temperature	pН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).		
0	8,2		1311	6.02	.810	-7.4	6.63	17.8:1	680		
6	۲. ا		12.95	6.01	.818	- 3.2	4.17	8.4-1	700		
10	a.1		12.99	6.01	·827	20.5	227	10.11	500		
80	9-1		13.12	6.03	.830	23.5	1.51	7-122	450		
25	1.2		12.95	6.00	327	26.7	1.20	5.251	4.50		
25 30	9.2		12.95	6.02	830	ຶ່ນ. 2	1.08	5.421	450		
135			12.96	6.01	.829	71.6	.96	5.7171	500		
40			12.86	6.03	.829	21.1	,84	5.84+1			
		·									
	<u></u>		<u> </u>				ļ				
					<u> </u>				,		
						ļ		_			
		···			<u> </u>						
				,							
		 — — —			<u> </u>	<u> </u>			<u></u>		
Water sample: Time collected:					Total volume	of purged water	removed:	8 95	1		
Physical appear						Physical appe	arance at sampli	ing			
	Color		dordy				Color		_		
Sheen/Free Pro	Odor	none				Sheen/F	Odor ree Product	none	-		
SHEELVI LEG FIL	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~								- 		
Samples collec	ted:			1000.4.4	dend en		December	Contain	or oH		
Container Size Container Type # Collected					Field Filt	erea	Preservative	Contair	ei pri		
40 m	550C/RD	9 4		3	- - 						
1 2	metal 5	PIE	4.5	2_	703	100	1440	3			
Notes											

O'Brien &	k Gere Engineers	s, inc.		Low Flow Ground Water Sampling Log									
Date		115759	_ Person	nel	REL	NHS	Weather	4402 01	ouch.				
Site Name	5-1 liver	ealco	_ Evacua	ation Method	اوم	Flow Blod	ela Well#	_ nau_	4				
Site Location	ner Ded for	ol, MA	_ Sampli	ng Method	1023 F	Zhan Bhall	Project #	5309.	200				
Well informati	on:												
Depth of Well *	•		ft		* Measure	ements taken fro	ջլո						
Depth to Water	r *	&	<u>5~1 ft.</u>				Top of Well Ca	sing					
Length of Wate	er Column		ft.				Top of Protective Casing (Other, Specify)						
Water parame	ters:	Position pump i	ible pump slowly the n center of screene at every three min	d interval & n			ers/minute		····				
		Depth	at every timee min	iule intervais		Oxidation	Dissolved	*	1				
Elapsed		To Water	Temperature	pН	Conductivity	Reduction	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).				
Time	8 00	water	11.7/	 		~85.7	.67	46.1±1	200				
0	8.65	***	12,22	6.55	.355	~1226	128	21.121	100				
-5	8.55		12.35	6,56	,446	-1438	.31	1211					
10	8.57		12,36	6.88	.446	-180,6	.16	128±1					
20	8,57	·	12,38	6.58	.419	-1482	110	6.9111	200				
28	70.0.		12.29	6.58	.406	7146.6	.11	6.3311	~~~				
30	8,6		98' 1238	6.55	1404	-146.0	17	1	_				
<u> </u>	* * 0		72, 12.38	6.3 3	101	110.0	1 7						
			 	 									
		-	1										
		 	 			<u> </u>							
		-	<u> </u>										
	 					 	-						
	-		 										
			 						<u> </u>				
								 					
									 				
Water sample	:		<u> </u>		<u> </u>	1	<u> </u>	<u></u>	<u> </u>				
Time collected	1630	d contribution side			Total volume of	of purged water	removed:	_ 5	el_				
Physical appea			0			Physical appea	arance at sampl	- 4					
	Color Odo		y correct				Color Odor		-				
Sheen/Free Pr		2000				Sheen/F	ree Product	none	-				
Samples colle	ected:	7											
Container Size Container Type				# Collected	Field Filte	ered	Preservative	Contain	er pH				
40 m	VOC_	VOA		3		_	He (<u> </u>					
16	sepe/PCB	8 42	<u> </u>	3	225								
1 4	~cvc(s	PE				20	HYO	3					
<u> </u>		1					1						
Notes:													

Turb meder cont catibrate property. Readys very ± 1 NTU. will not read selow 5.7 NTC

O'Brien &	Gere Engineers	, Inc.			Low Flow Ground Water Sampling Log							
Date		115758	Personi	nel	REH	7414	Weather	30°F 00	d			
_			Evacua	tion Method				mw- 4				
Site Name	Nen Bealdon			ng Method				6509.00				
Site Location		2, 110										
Well information	on:		_		• • • • • • • • • • • • • • • • • • • •							
Depth of Well *			ft		- measure	ments taken from	Top of Well Ca	eina				
Depth to Water		8.2	\$ 				Top of Protective	•				
Length of Water	r Column		R				(Other, Specify	-				
							, , , , , , , , , , , ,	,				
Water paramet		Position pump in	ble pump slowly three center of screener at every three min	d interval & m	nt water column aximum pumpir	ng rate of 0 5 lite	ers/minute					
		Depth				Oxidation	Dissolved	ऄ →				
Elapsed Time		To Water	Temperature	рН	Conductivity	Reduction Potential	Oxygen (mg/l)	Turbidity (NTU)	Flow Rate (ml/min).			
0	8.3		13.75	6.06	,778	-826	2.34	8.1321	400			
6	8.3		1383	5,93	,781	-103.3	,23	6.30=1	400			
10	8.3		13 89	8,8	7782	-1058	.20	6.001	375			
16	8.3		1367	6.8	1778	-116.5	.60	6.05-1	370			
20	<u> </u>		1374	8.74	,779	-121.5	.19	8.7711				
26			(3.5)	5.78	,777	-1237	.31	1258.2	350			
30	8.3		13.64	5.80	.777	-126.D	,41	5.69-1				
35	0:-	·	13.77	5.79	,750	-127.3	, 26	5.9 11				
40	8.3	-	1342	5.74	.775	~1305-	.06					
45	8.3.	· - · ·	1337	5,74	772	-130,5	, o S -	6,73 t1				
80	8.3		13.48	5,23	.773	-1315	.07		380			
100	- B -		75.78			1						
<u> </u>	· · · · · · · · · · · · · · · · · · ·											
					(
												
				`								
		· · ·		 	1	,						
Water sample	:				1			~	,			
Time collected	. <u>1500 </u>	Latter Color (1984)			Total volume	of purged water	removed:	85.	<u> </u>			
Physical appea			. / 0			Physical appe	arance at sampl					
	Color Odor		cloudy				Coloi Odoi		-			
Sheen/Free Pr		MARIE.			\	Sheen/F	ree Product	~~~	_			
						<u> </u>						
Samples colle		Containe	r Type	# Collected	Field Filt	ered	Preservative	Contair	ner pH			
Container Size			# Collected	rieiu riit		HC(Contail					
1 6	SUBL/PCA	<i>VD</i>	85	3								
16	metals	900		2	جيم ز	1	Hro	7				
Notes												

Notes:

- About the colibrate property. Readings off by \$1. Readings. with not to U

below 5.7 mm

Appendix D



Piezometric Pressures/Levels Field Data and Calculation Sheet

Client: Succivan's UEdge Date: 12/17/99 Pressure Probe Type:_____ Datum: Job No.: <u>5509.005</u> Serial No.: _ Drillhole No.:___ Elev. Ground Sfc:_ Height MP Casing psia kg/cm² mH₂O Location: ECTabove Ground Sfc: Range: 0 to___ Elev. top of Weather: Cold - Clear Casing Size/Type: 4" meta MP Casing:_ Reference Elev. Barometric Pressure: 14.23 Operator: RLM Steel Casing: 1200

Ambient Reading (Pressure/Temperature/Time): Start /36							506 Finish						
	P((atmos)						Water Level (PV	()				
Depth t	o Meas.	Elev. Meas.	Fluid F psi	ressure Rea kg/cm² m	adings	T		Press. Head	Piez. Level				
	ve(ft) m	Port	Inside	Outside	Inside	Trans.	Time, H:M:S	Outside Port,	Outside Port, ft , m	Comments			
From Log	From Cable	ft, m Dp	Casing P(i)	Casing P(o)	Casing P(I)	Temp. •K,©		H—P(o) P(atmos)	Dz = Dp - H				
267	270'9"		121.63	131.03	121.63	12.85		24.01 ft					
148	149'10"		69.38	74.98	69.39	12.35		24.56					
122	124'4"		58.48	64.10	58.49			24.67	-				
72	74'		36.66	42.35	36.68	12.04		24.90					
62	63'11"			37.74				24.93					
37	38'8"		21.38	26.87	21.39	12.10		25.03					
							·						
				•									
	İ												
·													
		•											
						~-							



	ew Bedford, MA	Date <i> 2 7 </i> 99
Monitoring Well No. ECJ-I Sampling Zone N	lo. <u>267′</u> Start Time	End Time
Water Level In MP Casing: (start)	(end)Technicians_	
Sampler Probe Preparation - See Sampling Plan	Collection Bottle Preparation	n - See Sampling Plan

		Surfa	ce Fun	ction	Checks		Position Sampler										
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve		Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
1	V	/	/		/	/	/	123.41	/	130.76	/	130.14		/	123.34	11	
2	✓	/	✓ .		✓	/		123.31	/	130.74	/	130.51	/		12332	14	
3	✓		/	<u>/</u>	/			123.26	/	130.72	/	130.07	/		12326	IL.	
4	✓	/	/		V	/	/	123.21	V	130.71	V	130.30	/	77	/23,20		
5	/	/	/	/	/			123.15	V	130.70	/	130.07	/		123.18	14	
ی			_		/	<u> </u>		123.12	/	130.68		130.16			123.14	IL	
																	Total Volume



Project Sullivan's Ledge	Location	New Bedfor	ed, ma	Date	12/17/99
Monitoring Well No. ECJ-I	Sampling Zone	No. <u>148′</u>	Start Time	End Tim	
Water Level In MP Casing: (sta		_ (end)	Techni	cians Rew	
Sampler Probe Preparation - Se	e Sampling Pla	an Collec	ction Bottle Prep	paration - See Sa	mpling Plan

		Surfa	ce Fun	ction	Checks		Position Sampler		T								
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
	V	√	/	J	✓	/		70.82	/	74.65	/	74.55	7	/	70.84	11	
2	/		/	<u>/</u>	/	/		70.78	/	74.61		74.39	V	/	70.80	14	
3	/		_/			/	<i></i>	70.74		74.60	/	74.41	/	/	70.79	14	
4						<u> </u>		70.74		74.60	/	74.40	/	/	70.77	IL	
5			_/		✓	_/	<u> </u>	70.71		74.60	/	74.47	/	1	70.72]L	
											ŀ						Total Volume



Project Sullivan's LEdge Location New Bedford	Date_ <i> 2 </i> 18 99
Monitoring Well No. <u>ECT-1</u> Sampling Zone No. <u>IQQ\</u> Start Time	End Time
Water Level In MP Casing: (start) (end) Technicians_ Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	RRM /NHS
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	n - See Sampling Plan

		Surface Function Checks							T								
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
1	~	~	V	V	V	~	V	59.86	V	63.88	~	63.81	V	V	59.87	- 1L	
2	~	V	V	~	V	V	V	<i>5</i> 9.83	1	63.88	~	63.80	V		59.84	L	
3	V	V	V	V	~	~		59.81	~	63.86	~	63.80	~	~	59.81	1	
4	レ	V	V	~	V	V	V	54.78	~	63.86	<u></u>	63.76	V		59.79	14	
5		V	V	<u> </u>	U	V	V	54.75	<u></u>	63.85	<u>~</u>	63.78	V	~	59.76		
																	Total
		1													İ		Volume



Project Sullivan's Ledge Location New Redford	Date_12 18 99
Monitoring Well No. <u>EC.T-1</u> Sampling Zone No. <u>72\</u> Start Time	End Time
Water Level In MP Casing: (start) (end) Technicians	RRH/NHS
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparatio	n - See Sampling Plan

		Surfa	ce Fun	ction	Checks		Position Sampler										
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Ciose Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
1	~	1	(/	~	~	レ	37.89	1	42.10	V	42.08	V	V	37.90	16	
2	~	/	<u></u>	~	~	4	~	37.88	V	42.12	7	42.01	1	7	37.89	IL	
3	~	~	ン	<u></u>	~	<u>_</u>	~	37.82	<u></u>	42.09	L	42.01	~	V	32.83	14	
4	~	~		/	~	<u></u>	~	37.80	<u></u>	42.10	V	42.03	<u></u>	-	37. ₈ l	IL	
5	L	_	~	<u></u>		<u>~</u>		32.73	<u>_</u>	42.07	U	42.01	V	U	37.76	IL	
\dashv																	
																	
																ı	Total Volume



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Groundwater Sampling Field Data Sheet

Project <u>Sullivans</u> Ledge Location <u>New Bedford</u>	Date 2 18 99
Monitoring Well No. <u>ECT-1</u> Sampling Zone No. <u>62\ Start Time</u>	End Time
Water Level In MP Casing: (start) (end) Technicians Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	RRMINHS
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	า - See Sampling Plan

		Surfac	ce Fun	ction	Checks		Position Sample Collection Checks									Ţ	
Run No.	Activate Shoe	Ciose Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
1	~	<u></u>	1	4	4	4	_	33.30	4	32.53	V	37.45	~	<u>_</u>	33:27	12	
2	~	<u></u>	~	4	4	-	<u> </u>	33:27	-	37.54	1	37.44	~		33.27	14	
3	レ	<u>_</u>	4	4	4	-	_	33.24	1	37.54	~	37.40	1	~	33.25		
4	4	4	-	<u>_</u>	<u>_</u>	-	_	33.21	4	37.53		37.40	7	J	33.22	ال	
5	<u></u>	4	_	-	~	_	4	33.17		37.53		37.43	V		33.20		
6	~	4	4	-	-	-	4	33.13		37.54	~	37.45	4		33.16	11	
7	<u>_</u>	-	-	4	4	-	-	33.11		37.53	~	37.44	<u></u>		33.12		
છ	4	4	-	4	-	-		33.08		37.53	~	37.43	~	1		15	
9	-	-	-	-	-	-		33.04	\neg	37. <i>5</i> 3	<u></u>	37.41	-		33.08 32.04		
10	_	-	<u>_</u>	_	-	-		33.64		37.54	<u>_</u>	37.44	-		33.06 33.04	16	Total Volume

Field Determinations (Appearance, pH,S.C.,etc.)

DuP #1 Collected HERE



Project <u>SULLivans Ledge</u> Location <u>New Bedford</u>	Date_12/14/99
Monitoring Well No. <u>Ect.</u> Sampling Zone No. 31 Start Time	End Time
Water Level In MP Casing: (start) (end) Technicians	RRM/NHS
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	n - See Sampling Plan

	;	Surfa	ce Fun	ction	Checks		Position Sampler										
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve		Pressure in MP	Volume Retrieved	Comments
1	~	~	<u></u>	<u>_</u>	-	~	_	22.14	4	26.76	U	26.65	L	4	22.18	16	
2	4	~	~	~	_	_	~	22.13	_	26.78	L	2678	~	4	22.16	11	
3	~	4	4	4	_	_	<u></u>	22.12		26.78		26.77	J	4	22.15		
4	~	~	-	4	_	_	-	27.08		26.78		26:73	~	_	22.11	<u> </u>	
5	~	4	_	4	_	_	4	22.06		26:77	~	26.77	~	7	22.07	IL.	
6	~	-	4	-	-	_	_	27.03		26.79	4	26.76	-	~	22.95		
7	4	4	_	_		_		22.01		26:79		26:73	ر		22.02		
8	_	4	4	-	_	4		22.97		26.78		26.76	-		22.00	11	
9	-	4	4	-	_	_		21.92		26:77			4		21.96	14	
10	4	4	_	-	-	_		21.91	1	26.78		26.74	<u></u>		21.92	1111	Total Volume

Field Determinations (Appearance, pH,S.C.,etc.)

Ms and MSD Collected Here



Page 6 of the

Groundwater Sampling Field Data Sheet

Project Sullivan's Lege Location New Redford	Date 2 9 99
Monitoring Well No. ECT- (Sampling Zone No. 37) Start Time	End Time
Water Level In MP Casing: (start) (end) Technicians	RRA /NHS
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	- See Sampling Plan

	Surface Function Checks Activate Close Check Open Evacuate Close						Position Sampler										
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
11	<u></u>	4	4	1	4	7	<u></u>	21.90	4	26.77	U	26.77	L	~	21.91	14	
12	4	~	~	<u>_</u>	4	4	4	21.87	4	26.76	J	26.75	4	4	21.87	11	
13	~	~	4	~	4	<u>_</u>	-	21.82	_	26.76		26.75	4	4	21:83	16	
14	<u></u>	<u></u>	4	<u>_</u>	4	4	-	21.30	<u>_</u>	26.78	_	26.76	_		21.32	16	
	<u> </u>																
				}							1		- 1	1		1	Total Volume

	1		1	
Page	1	of	1	



Piezometric Pressures/Levels Field Data and Calculation Sheet

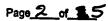
Datum:			Pressure	Probe Typ	e:	Clie	_{te:} <u>12/20/99</u> :							
Elev. Grot	und Sfc:		Serial No.	:	·	Job	No.:5	509.005	Drillhole No.					
Height M	P Casing							_						
Elev. top	ound Sic:	11 Cr	Hange: U	το	psia	Kg/cm²	mH ₂ O	Location:	- () (\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \					
MP Casin	g: <i>d·0</i> ·	9 tt_	Weather:	<u>Cold</u> -	CLEAR	Casi	ing Size/Ty _l	pe: 4" m	etal					
Reference	Elev.		Dåra atri	• D=======	14.84	/	77	Du1						
Steel Cas	ing:		Barometri	c Pressure	: 110	Оре	rator:K	CIVI						
Ambient F		essure/Tempe atmos)	rature/Time): Start /500 Finish											
			· · · · · · · · · · · · · · · · · · ·	Fluid Pressure Readings Press Hoad Piez Level										
	to Meas. lve(ft),m	Elev. Meas.	Huid F psi			Trans.	Time.	Press. Head Outside Port	Piez. Level Outside Port.					
From	From	Port ft , m	Inside Outside Inside		Temp_	H:M:S	-tt , m-	ft, m	Comments					
Log	Cable	Dp	Casing P(i)	Casing P(o)	Casing P(I)	°K,⊚		H= P(0) - P(2(11875)	Dz = Dp - H					
187	187' 1"			95.59				17.83 ft						
152	150' 11"		71.99	81.75	72.00	11.60		17.97						
117	116		57.50	64.43	57.51	11.64		18.17						
82	80'8"		42.53	49.51	42.55	11.58		18.27						
47	456"			34.16				18.39						
										· -				
							·							
							\ <u>-</u>							
		V												
							<u> </u>							
						<u> </u>								
	1													
														
		,												





Project <u>Sullivans Ledge</u> Location <u>New Bedford</u>	Date (12/4/99 - 12/20/99)
Monitoring Well No. ECT-2 Sampling Zone No. 187\ Start Time	End Time
water Level In MP Casing: (start) (end) Technicia	ns RRM / N Hs
Sampler Probe Preparation - See Sampling Plan Collection Bottle Prepara	ation - See Sampling Plan

	,	Surfa	ce Fun	ction	Checks		Position Sampler		Sample Collection Checks								
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Vaive	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve		Pressure in MP	Volume Retrieved	Comments
	<u></u>	V	U	U	0	0	4	87.56	_	95.21	~	94.35	V	~	87.57	14	Slow
2	~	~	V	0	~	-		87.44		95.23	<u></u>	94.06	2		87.45	14	Slow
3				<u>u</u>		<u></u>		87-39		94.60		94.01	<u>_</u>	4	87.41	IL	SloW
7	1,					_		87.35		94.48		93.51	ت	-	8735	14	Slow
3		<u></u>	0	0		<u></u>		86.19	_	94.11	<u>_</u>	93.50	-	<u>_</u>	<u>8637</u>	16	only used two samples
																	Total Volume





Project Sullivan's ledge Location New	Date 12/20/99
Monitoring Well No. <u>ECT-2</u> Sampling Zone No. 1	52\ Start Time End Time
Water Level In MP Casing: (start)(end	
Sampler Probe Preparation - See Sampling Plan	Collection Bottle Preparation - See Sampling Plan

		Surfa	ce Fun	ction	Checks		Position Sampler										
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
1	1	2	~	U	U	4	<u>_</u>	73.39	<u>_</u>	80:71	L	80.12	~	-	73.40	IL	Slow filling
2	4	~	~	~	~	4	-	73.37		80.79	U	79.93	_	-	73.36		SIOW + Ming
3	4	~		~	~	~	<u></u>	73.31	U	80.35	4	79.40	-	_	73.31	14	Slow Filling
4	~	~	<u></u>	~	4	~		73.25	U	80.19	~	79.16	_	_	73.28	16	510w filling 510w filling
																	0
				_													
																	Total Volume_



Page 3 of 5

Groundwater Sampling Field Data Sheet

Project Sycilan's Ledge Location New Redfiel Date 1/3/2000

Monitoring Well No. ECJ - Z Sampling Zone No. 1/7' Start Time 0830 End Time

Water Level In MP Casing: (start) (end) Technicians Proper NHS

Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

			ce Fun	ction	Checks		Position Sampler										
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
	\		/	V	<u>/</u>	/	V	58.49	/	63.80	✓	63.95	/	1	58.50	IL	SUNNY 45°F
2	V	-	<u> </u>	<u> </u>		V		58.45	/	64.18	<u>\</u>	63.97	/	/	58.47	11	" B
3							V	58.44		64.22		63.48	/		58.47	IL	Į,
	ļ																Total
<u></u> -			L											_			Volume



Project Sucivan's Ledoe Location New Bedford	Date 1/3/00
Monitoring Well No. ECJ- Z Sampling Zone No. 82 Start Time 1000	End Time
Water Level In MP Casing: (start) (end) Technicians	
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	n - See Sampling Plan

	,	Surface Function Checks															
Run No.	Activate Shoe	Ciose Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	in MD	Activate Shoe	Pressure in Zone	Open Valve	Final Zone Pressure ()	Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved ()	Comments
1	V	V	<u> </u>	>	✓	/	/	43.47	/	48.88	J	48.68	/	/	43.49	16	Clauda 45° F
2	/	✓	/	<u>/</u>	<u>/</u>	1	/	43.48		48.89		48.47	/	/	43.49	14	Cloudy 45° F
3						/	✓	43.42		48.90	\	48.58	/		43.43	16	l'
-																	
																	·
																	Total Volume



Page 5 of 5 Groundwater Sampling Field Data Sheet

Project Succions Ledge Location New Bedford	Date_//3/00
Monitoring Well No. ECT-2 Sampling Zone No. 470 Start Time 1/20	End Time
Water Level In MP Casing: (start) (end) Technicians Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	RRM/NHS
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	1 - See'Sampling Plan

		Surfac	ce Fun	ction	Checks		Position Sampler										
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Vaive	Locate port release arm land probe		Activate Shoe	Pressure in Zone ()	Open Valve		Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
	/	<u>/</u>	<i>J</i>	1	<u> </u>	V	1	28.19		33.50	/	33.50	>	1	#834	16	Cloudy 45°
2	V					0	/	28.20	/	33.53	/	3353			28.22		
3	_		/	/		<u> </u>		28.17		33.52	1	33.50	/		28.21	14	**
									<u> </u>								
\dashv																	
														-			
																	Tatal
																	Total Volume

	1 /	
Page	of_ /	



Piezometric Pressures/Levels Field Data and Calculation Sheet

Datum:	Datum: Pressure Probe Type: Client: Succivans Ledge Date: 13 00												
Elev. Grou	und Sfc:		Serial No.	:		Job	No.: <u>5</u> 57	9.005	/ - Drillhole No.:				
Height M	P Casing		Range: 0	to	— Ocia)ka/om²		Location: <u>EC</u>	LT-4				
Elev. top	of		nange. o	Mand	Com (Ky/CIII-		pe: 4" Sta	200				
Reference	g: e Elev.		weather:	creary	surung 6	Cas	ing Size/Ty	pe: 7 313					
Steel Cas	ing:		Barometric Pressure: 14.66 Operator: NHS/REH										
Ambient Reading (Pressure/Temperature/Time): Start Finish Finish													
Depth t	to Meas.	Elev. Meas. Port		Pressure Re Dkg/cm² n		Trans.	Time,	Press. Head Outside Port,	Piez. Level Outside Port,	_			
From Log	From Cable	(ft), m	Inside Casing P(i)	Outside Casing P(o)	Inside Casing P(I)	Temp. *K.©	H:M:S	ft , m H = <u>P(o) - P(atmos)</u> W	ft , m Dz = Dp - H	Comments			
245	247' 1"	_	114.82	119.88	114.83	12.94	•						
227	227'		106.26	1/1.36	106.27	12.50	_	_					
162	161'7"			83.33				_					
132	131 11"	_	65.17	70.35	65.18	11.45	_	_					
87	86'z")	45.53	50.44	45.55	11.33							
62	61'		34.63	39.72	34.65	11.29	_						
				•						tu.			
			<u></u>	<u> </u>									
	<u> </u>												
									٠				



Project Surivan's Ledge Location New L	Bedford Date 1/4/00
Monitoring Well No. ECT-4 Sampling Zone No. Z	45 Start Time End Time
Water Level In MP Casing: (start) (end) Sampler Probe Preparation - See Sampling Plan	
oampier Probe Preparation - See Sampling Plan	Collection Bottle Preparation - See Sampling Plan

	,	Surfa	ce Fun	ction	Checks		Position Sampler			Sar	nple (Collectio	n Che	ecks		-	
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Ciose Valve	Retract Shoe		Retrieved (
1		/	V		/	>	<u>/</u>	1/6.37		1/9.48	/	119.12	/	/	1640	14	Rainy / windy
2			/	<i>V</i>	V		/	116.36	/	119.34	V	118.85	/	/	11637	14	H,
3		_						116.28	/	119.17		118.56	V	/	116.30		**
					-												
																	Total
			//														Volume



Project Survivans Ledge Location New	Bedfoed Date 1/4/00
Monitoring Well No. ECJ-4 / Sampling Zone No. 2 Water Level In MP Casing: (start) (end	227 Start TimeEnd Time
Complex During D	Collection Bottle Preparation - See Sampling Plan

		Surfa	ce Fun	ction	Checks		Position Sampler			Sar	nple (Collectio	n Che	ecks		<u> </u>	
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
1_	1	/	✓	1	\	J		107.08	J	110.60	1	10.08	7	1	107.69	16	PAIN/Whdy
2			<u> </u>	/	V	/	\	107.57		110.57	1	109.81	/	1	107.64	16	I,
3	<i>\\</i>		<i>\</i>		<i>\</i>	V /		107.72		110.47		110.04			107.7Z	14	11
4					V		<i></i>	106.65	/	116.45		109.84			106.67	IV	1/
																	
																	
																	7.1.1
																	Total Volume



Page <u>5</u> of 6

Groundwater Sampling

Field Data Sheet

Project Sucivar's Ledge Location New Bedford	Date 1/4/00
Monitoring Well No. 25-4 Sampling Zone No. 162' Start	t TimeEnd Time
Complex Ducks D	Technicians NKS REK Bottle Preparation - See Sampling Plan

	<u> </u>		ce Fun	ction	Checks	1	Position Sampler			Sar	nple	Collectio	n Che	ecks			
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve	Retract Shoe	Pressure in MP	Volume Retrieved ()	Comments
1	1	1		/	1	✓ <u> </u>	V	79.49	J	82.83	\	8265		7	79.35	11	Rainy windy
2	\				/	1	/	79.46	V	8282	\	82.72	/	1	79.47	16	11
3				✓		/		79.44	/	82.83		82.71	✓		79.45	14	Įt
										<u></u>							
																	Total
ــــــــــــــــــــــــــــــــــــــ	-4																√olume



Project Sucisans Ledge Location New Bed Ford	Date 1/4/00
Monitoring Well No. ECT-Y Sampling Zone No. 132' Start Time	End Time _
Water Level In MP Casing: (start) (end) Technicians Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	NHS/REH
Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation	n - See Sampling Plan

			ce Fun		Checks		Position Sampler			Sar	nple (Collectio	n Che	ecks		· · · · · · · · · · · · · · · · · · ·	
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	in Nam	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Close Valve		Pressure in MP	Volume Retrieved	Comments
	1	1		J	/			66.35	1	69.83	/	69.80	\	7	66.35	IL	Rany windy
2	/		/		/	1	1	66.32	1	69.84	/	69.82	/	1	66.33		in the second
3								66.27	/	6982		69.80	/	/	66.30	IL	1+
																	Total Volume



		_ 11.			_												rieid Data She
Proje	ct	Sulli	vans	Led	68	Locat	ion <u>//</u> Zone No (e	w B	MAR				Date	e //	Slaa		
Moni	toring	Well	No. Ec	J-4	Sam	pling	Zone No	. 87'	St	art Time	208	15	End T	ime	2518	-	
Wate	r Leve	i in M	1P Cas	ing: ((start)		<u> </u>	end)	=	Te	chnic	ians R	ren/	NHS	97.0		
Sam	oler Pr	obe F	Prepara	ition -	- See Sa		ng Plan					aration -	Seé s	Sampl	ing Pla	n	
		Surfa	ce Fun	ction	Checks		Position Sampler					Collectio	n Che	ecks			
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP	Activate Shoe	Pressure in Zone ()	Open Valve	Final Zone Pressure ()	Ciose Valve	Retract Shoe	Pressure in MP	Volume Retrieved	Comments
	V	>	/	/		/		46-67	/	50.22	1	50.22	V	7	46.68	IV	Clear / windy
2	✓		\checkmark		1	1	1	46.61	1	50.22		50.22			46.64	16	Coeucyunary
3	\ \	V	✓	✓		V	1	46.60		50.22		50.22	V		46.60		11
					<u> </u>												
				-													
	 -																
		}								j		į		- 1	Ī		Total

Field Determinations (Appearance, pH,S.C.,etc.)

Volume



Page 6 of 6

Groundwater Sampling Field Data Sheet

Project Succion New Bed Ford

Monitoring Well No. ECT-4 Sampling Zone No. 62' Start Time 0530 End Time

Water Level In MP Casing: (start) (end) - Technicians Rem / NHS

Sampler Probe Preparation - See Sampling Plan Collection Bottle Preparation - See Sampling Plan

Ambient: 36°F

		Surfac	e Fun	ction	Checks		Position Sampler	L.		San	nple (Collectio	n Che	ecks			
Run No.	Activate Shoe	Close Valve	Check Vacuum	Open Valve	Evacuate Container	Close Valve	Locate port release arm land probe	Pressure in MP ()	Activate Shoe	Pressure in Zone	Open Valve	Final Zone Pressure ()	Close Valve		Pressure in MP	Volume Retrieved ()	Comments
	✓	1	/	J	1	7		35.66	/	39.31	√	39.32	\checkmark	1	35.66	11	Clear/windy
2	/			/	✓	1		35.65	1	39.33	/	<i>3</i> 9.32	>		35,66	ート	111
3	/	V	/		1		<i>J</i>	35.61		39.35	/	39.34	<		35.64	14	"
																	-
																	
																	·
																	Total Volume

Appendix E



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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Volatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-1 N6920DL 12/17/99 4237 ug/L 148 ft.	ECJ-1 N6921DL 12/17/99 4237 ug/L 267 ft.	ECJ-1 N6918DL 12/18/99 4237 ug/L 122 ft.	ECJ-1 N6916 12/18/99 4237 ug/L 62 ft.	ECJ-1 N6917DL 12/18/99 4237 ug/L 72 ft.	ECJ-1 N6915 12/19/99 4237 ug/L 37 ft.	ECJ-2 N7526 01/03/00 4345 ug/L 117 ft.	ECJ-2 N7528 01/03/00 4345 ug/L 47 ft.
Compound						0.5011	2.5 U	500 U	50 U
1,1,1-Trichloroethane		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U		500 U	50 U
1,1,2,2-Tetrachloroethane		0.50 U	. 744.4	0.501)	0.50 U	0.50 U	25U		50 U
1,1,2-Trichloroethane		0.22 J	0.50 U	0.50 U	0.50 U	43	2.5 U	500 U	30 U
L.I-Dichiaroethane	U .	0.50 Ü	0.33 J	0.50 TJ	0,50 U	0.50 U	1.87	500 U	50 U
1,1-Dichloroethene		110 J	0.1 J	170 J	86 J	480 J	3.2	500 U	
1,2-Dichloroethane	. 14	2.8	0.13	11	7.4	15 👈 🚎	0.901	500 U	50 U
1,2-Dichloropropane		0.50 Ü	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	500 U	50 U
2-Butanone (MEK)		io U	10 V	10 U	10 Ú	to U	\$0 U	10000 U	1000 🗓
2-Hexanone		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5000 U	500 U
4-Methyl-2-pentanone (MIBK)	s.bu	5.0 U	5.0 U	5.0 U	5.0 U	25 U	5000 U	500 U
Acetone	•	10 U	10 U	10 U	10 U	10 U	50 U	10000 U	1000 U
Benzene		45	4.2	150 J	96J	140 J	30.	500 U	50 U
Bromodichloromethane		0.50 Ü	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	500 U	50 U
Bromoform		0.50 U	0,5013	0.50 U	0.50 U	0.50 U	2.5 U	500 ¥	50 U
Bromomethane		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1000 U	100 U
Carbon disulfide	•	0.50 U	0.50 U	0.50 U	0,50 U	0.501)	25 U	500 U	50 U
Carbon tetrachloride		0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	2.5 U	500 U	50 U
Chlombenzene	.	1830 30	1.0	2.6	7.6	2.2		500 U	171
Chloroethane		1.0 UJ	1.0 ŬĴ	1.0 ÜJ	1.0 UJ	1.0 UJ	5.0 UJ	1000 UJ	100-UJ
Chloroform		0300	0.50 U	0.50 U	0.50 U	0.50 U	2510	500 U .	50 U
Chloromethane		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1000 U	100 U
•		0.50 U	0.50 U	0.50 Ü	0.50 U	0.50 U	2.5 U	500 U	SO U
Dibromochioromethane Ethylbenzene	.'	1500	130	2000	260 J	1900	23	1400	50 U
Methylene chloride	٧.	200		2.0 U	2.00	2.0U (%)	100	2000 U	200 U
Styrene	· ·	0.50 U	0.11 J	0.91	2.9	1.8	0.90 J	500 U	50 U

NOTES:

U - not detected, J - estimated, R - unusable.

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\$509,005

File Number:

O'BRIEN & GERE ENGINEERS, INC.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Volatile Organic Compound Data

-	Sample ID Lab ID Sample Date SDG ID Units	ECJ-1 N6920DL 12/17/99 4237 ug/L 148 ft.	ECJ-1 N6921DL 12/17/99 4237 ug/L 267 ft.	ECJ-1 N6918DL 12/18/99 4237 ug/L 122 ft.	ECJ-1 N6916 12/18/99 4237 ug/L 62 ft.	ECJ-1 N6917DL 12/18/99 4237 ug/L 72 ft.	ECJ-1 N6915 12/19/99 4237 ug/L 37 ft.	ECJ-2 N7526 01/03/00 4345 ug/L 117 ft.	ECJ-2 N7528 01/03/00 4345 ug/L 47 ft.
Compound Tetrachloroethene Toluene Trichloroethene Vinyl chloride Xylene (total) ciss (2-Dichloroethene ciss (3-Dichloropropylene trans-1,2-Dichloropropone trans-1,3-Dichloropropone		0.50 U 110.1 3.6 3400 14 31000 0.50 U 290.1	0.50 U 4.2 3.8 1.3 1.6 13 0.50 U	0.50 U 1100 11 6100 46 62000 0.50 U 320.1	0.50 U 120 J 9.2 15000 21 57000 0.50 U 340 J 0.50 U	3.1 360 J 19000 2700 72 120000 0.50 U 620 J 0.50 U	2.5 U 23 92 460 3.0 1600 2.5 U 8.8 2.5 U	500 U 1600 500 U 8100 500 U 44000 1000 U 280 J 500 U	50 U 30 U 21 J 180 50 U 2300 50 U 15 J 50 U
						<i>,</i>			1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2
	·.						*		
		* * * * * * * * * * * * * * * * * * * *	•		•	. •			1.4 444
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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Volatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-2 N7527 01/03/00 4345 ug/L 82 ft.	ECJ-2 N6951DL 12/19/99 4249 ug/L 187 ft.	ECJ-2 N6952 12/20/99 4249 ug/L 152 ft.	ECJ-4 N7532 01/04/00 4345 ug/L 132 ft.	ECJ-4 N7531 01/04/00 4345 ug/L 162 ft.	ECJ-4 N7530 01/04/00 4345 ug/L 227 ft.	ECJ-4 N7529 01/04/00 4345 ug/L 245 ft.	ECJ-4 N7607 01/05/00 4357 ug/L 62 ft.
Compound						0.50 U	0.50 U	0.50 U	0.50 U
1,1,1-Trichloroethane		120 U	5.0 U	5.0 U	0.50 U		**	0.50 U	0.50 U
1.1.2.2-Tetrachloroethane		120 U	5.0 U	5.0 U	0,50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,1,2-Trichloroethane		120 U	5.0 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
L1=Dichloroethane		120 U	1.8.1	2.9 J	0,50 U	0.50 U	0,50 U		0.50 U
1,1-Dichloroethene		120 U	5.0 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
2-Dichioroethane		120 U	161 .	2.6 I	0.50 U	0.131	0.50 U	0.50 U	>25550000000000000000000000000000000000
1,2-Dichloropropane	•	120 U	5.0 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone (MEK)		2500 U	100 U	100 111	10 UJ	to UI	iou.	10 U	1013
2-Hexanone		1200 U	50 U	50 U	5.0 UJ	5.0 UJ	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (MIBK)	;	1200 U	50 U	50 U	5.0 U	5.0 Ü	5.0 U	5.0 U	\$0U 10U
Acetone		2500 U	100 U	100 U	10 U	3.5 J	10 U	10 U	10 U
Benzene		80.1	•	20	0.50 U	0.53	0.50 U	0.50 U	0.50 U
Bromodichloromethane		120 U	5.0 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
		120 U	· 5.0 U	5.0 U	0.50 U	0.50 IJ	0.50 U	0.50 U	0.50 Ü
Bromoform		250 U	10 U	10 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane		120 U	5.0U	5.0 U	0.50 U	0.5010	0.64	0.85	0.50 Ü
Carbon disulfide		120 U	5.0 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 Ü
Carbon tetrachloride			26)	5.0 U	0,50 U	0.61	1.6	0.153	0.50 U
Chlorobenzene		120 U		10 UJ	1.0 U	1.0 U	1.0 UJ	1.0 UJ	1.0 UJ
Chloroethane		250 UJ	10 UJ 50 U	5.0 U	0.50 U	0.500	0.50 U	0.50 Ŭ	>0.50 U
Chloroform		1201)	* 134		•	1.0 U	1.0 U	1.0 U	1.0 U
Chloromethane		250 U	10 U	10 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U
Dibromochloromethane		120 U	4 5.0U	5.0 Ŭ	0.50 T			7.0	0.50 U
Ethylbenzene		1000 U	170	64	0.20 J	2.4	1.8		2.0 U
Methylene chloride		500 U	20 U	20 ta	2.0 U	0.42.1	200	2.0 U	\SMP######
Styrene	•	120 U	5.0 U	5.0 U	0.47 J	6.1	0.50 U	1.8	0.50 U

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Volatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-2 N7527 01/03/00 4345 ug/L 82 ft.	ECJ-2 N6951DL 12/19/99 4249 ug/L 187 ft.	ECJ-2 N6952 12/20/99 4249 ug/L 152 ft.	ECJ-4 N7532 01/04/00 4345 ug/L 132 ft.	ECJ-4 N7531 01/04/00 4345 ug/L 162 ft.	ECJ-4 N7530 01/04/00 4345 ug/L 227 ft.	ECJ-4 N7529 01/04/00 4345 ug/L 245 ft.	ECJ-4 N7607 01/05/00 4357 ug/L 62 ft.
Compound Tetrachloroethene		120 U	5.0 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Toluene		940	180	54	0.201	0.77	0.94		0.17 J
Frichloroethene		120 U	1.8 J	2.9 J	0.50 U	0.50 U	0.19 J	0.50 U	0.50 U
Vinyl chloride		14000	1500	100	0,41 J	1.7	1.2	3.9	1.013
Xylene (total)		120 U	5.0 U	5.0 U	0.50 U	0.12 J	0.50 U	0.50 U	0.50 U
la-1,2-Dichloroethene	•	860	1700	140	0.23 J	0.39 J	0.58	1.0	0.393
:is-1,3-Dichloropropylene		120 Ú	5.0 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
rans-1,2-Dichloroethene		62.1	25	14	0.50 U	0.50 U	0.50 U	0.50 U	7030U
trans-1,3-Dichloropropene		120 U	5.0 U	5.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
		;					**) %		
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NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1) Volatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-4 N7606 01/05/00 4357 ug/L 87 ft.	GCA-1 N5441 11/18/99 3958 ug/L	MW-12 N5440 11/18/99 3958 ug/L	MW-13 N5502DL 11/17/99 3970 ug/L	MW-13A N5501 11/17/99 3970 ug/L	MW-14 N5159 11/12/99 3903 ug/L	MW-15 N5065 11/10/99 3886 ug/L	MW-16 N5063 11/11/99 3886 ug/L
Compound							0411	0.50 U	0.50 U
1,1,1-Trichloroethane		0.50 U	50 U	1.0 U	0.50 U	0.50 U	25 U		ຸ030ປ
1,1,2,2-Tetrachloroethane		0.50 U	50 U	ron	0.50 U	0.50 U	25 U	0.5013	
1,1,2-Trichloroethane		0.50 U	50 U	1.0 U	0.50 U	0.50 U	25 U	0.50 U	0.50 U
LI-Dichloroethane		0.50 U	30 U	0.401	0,50 U	0.50 U	25 U	0.14.)	0.5010
1,1-Dichloroethene		0.50 U	18 J	1.0 U	4.4	0.50 U	25 U	0.50 U	0.50 U
1,2-Dichloroethane		0.50 U	50 U	1.0 U	0.50 U	0.50 U	25 U	0.50 U	0.5010
1,2-Dichloropropane		0.50 U	50 U	1.0 U	0.50 U	0.50 U	25 U	0.50 U	0.50 U
2-Butanone (MEK)		10 U.	1000 U	20 U	10 U	to U	500 U	10 U	1010
2-Hexanone		5.0 U	500 U	10 U	5.0 U	5.0 U	250 U	5.0 U	5.0 U
4-Methyl-2-pentanone (MIBK	à	5.0 U	500 TJ	to U	5.0 U	5.0 U	250 U	5.0 U	5.0U
Acetone	•	10 U	1000 U	20 U	10 U	10 U	500 U	10 U	10 U
Benzene		0.50 U	470	61	2.9	0.65	570	11	1.7
Bromodichloromethane		0.50 U	50 U	1.0 U	0.50 U	0.50 U	25 U	0.50 U	0.50 U
Bromoform		0.50 U	50 U	¥0.1	0.50 U	0.50 tj	25 U	0.50 U	0.50 U
Bromomethane		1.0 U	100 U	2.0 U	1.0 U	1.0 U	50 U	1.0 UJ	1.0 UJ
Carbon disulfide		0.50 U	50 U	1.0 U	0.50 U	0.50 TJ	25 U	0.50 ¥	0.50 U
Carbon tetrachloride		0.50 U	50 U	1.0 U	0.50 U	0.50 U	25 U	0.50 U	0.50 U
Chiorobenzene		030U	320	37	1,9	1.7	45	3.0	0.50 U
Chioroethane		1.0 UJ	100 UJ	2.0 UJ	1.0 UJ	1.0 UJ	50 U	1.0 U	1.0 U
Chlomform		0301)	. 50 U	t.o U	0,50 Ü	0.50 U	25 U	0.50 U	0.30 U
Chloromethane		1.0 U	100 U	2.0 U	1.0 U	1.0 U	50 U	1.0 U	1.0 U
		0.50 ()	50 U	LOU	0.500	0.50 U	25 0	0.50 U	0.50.U
Dibromochloromethane		0.50 U	93	1.0 U	3.4	0.50 U	25 U	0.50 U	0.50 U
Ethylbenzene				4.0 U	2.0 U	2.0 U	100 Ü	2.0 U	200
Methylene chloride Styrene		2.0 U 0.50 U	200 U 50 U	1.0 U	2.0 U	0.50 U	25 U	0.50 U	0.50 U

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Volatile Organic Compound Data

Compound Fetrachloroethene Folizene Frichloroethene Vinya enloride	s ug/L 87 ft. 0.50 U 0.18 J	50 U	1.0 U					
Foliners Frichloroethene Vinys chloride	0.183		1011					0.50 11
Prichloroethene Vinyt chloride	A 200.1 A 4.			0.50 U	0.50 U	25 U	0.50 U - 0 .50 U	0.50 U 0.50 U
Vinyi chloride	0.70 **	74	0.26 J 1.0 U	1,2 18	0.10 J 0.17 J	25 U 25 U	0.50 U	0.39 J
000000000000000	0.50 U 1.0 U	160 1700	2.013	110	11	50 U.	1.0 U	100
Xylene (total)	0.50 U	59	5.4	0.26 J	0.50 U	6.5 J	0.50 U	0.24 J
cisal Z-Dichiaroethene	0371	11000	r.o U	840	15	.isJ	0.34.1	2.8
cis-1,3-Dichloropropylene	0.50 U	50 U	1.0 U	0.50 U	0.50 U	25 U	0.50 U	0.50 U
+1.2-Dichloroethene	0.50 U	\$2.	1.0 U	9,3	0.22 J	25 U	0.50 U	0.50 U
trans-1,3-Dichloropropene	0.50 U	50 U	1.0 U	0.50 U	0.50 U	25 U	0.50 U	0.50 U
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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Volatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-17 N5442 11/18/99 3958 ug/L	MW-2 N5161 11/12/99 3903 ug/L	MW-22A N5500 11/17/99 3970 ug/L	MW-24 N5064DL 11/11/99 3886 ug/L	MW-4 N5288 11/15/99 3930 ug/L	MW-4A N5289 11/15/99 3930 ug/L	MW-5 N5292 11/16/99 3930 ug/L	MW-5A N5293 11/16/99 3930 ug/L
Compound									_/
1,1,1-Trichloroethane		0.50 U	25 U	12 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
I.I.22-Tetrachloroethane	•	0.50 U	25 U	12 U	0.50 U	0.50 U	0,50 U	0.50 U	03010
1,1,2-Trichloroethane		0.50 U	25 U	12 U	0.30 J	0.50 U	0.50 U	0.50 U	0.50 U
I, I-Dichleroethane		0.50 U	25 U	120	0,50 U	0.52	0.50 U	0,50 TJ	030 U
1,1-Dichloroethene		0.50 U	25 U	12 U	1.1	2.2	0.50 U	0.50 U	0.50 U
12-Dichlorosthane	•	0.50 U	25 0	120	0.50 U	0.15 J	0.50 U	0.50 U	0.50 TJ
1,2-Dichloropropane		0.50 ับ	25 U	12 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
2-Butanone (MEK)		831	500 U	250 U	10 U	to U	10 U	10 U	10111
2-Hexanone		5.0 U	250 U	120 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 UJ
4-Methyl-2-pentanone (MIBK	3	5.0 Ü	250 U	120 U	1.5 J	5.0 U	* \$.0 U	5.0 U	5.00
Acetone	₹,	10 Ü	500 U	250 U	10 U	. 10 U	10 U	10 U	10 U
Benzene		0.50 U	32	670	3100	9.2	0.50 U	0.50 U	0.50 U
Bromodichloromethane		0.50 U	25 U	12 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Bromoform		0.50 U	. 25 U	12 U	0.50 U	0.50 U	0.50 U	0.50 U	0.5010
Bromomethane		1.0 U	50 U	25 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide		0,50 U	25 U	12 ¥	0.50 ¥	0.50 U	0,50 U	0.50 U	0.50 U
Carbon tetrachloride		0.50 U	25 U	12 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
Chiorobenzene		0.50 Ü	110	42	95	0.5010	0.50 U	0.50 U	0.50 U
Chloroethane		1.0 UJ	50 U	25 U	11	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform		0.50 U	. 25 U	12 U	0.50 U	0.50 U	0.50 🖰	0.50 U	0.50 U
Chloromethane		1.0 U	50 U	25 UJ	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	:	0.50 D	. ∑ 25U	12 U	0.50 U	0.5010	0.50 T	0.50 U	0.50 U
Ethylbenzene		0.50 U	25 U	190	3.1	0.31 J	0.50 U	0.50 U	0.50 U
Methylene chloride		200		50.U	2.0 U	2.00	2.010	2.0 U	2.0 U
Styrene Chloride	. :	0.50 U	25 U	12 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Volatile Organic Compound Data

	s u	958 ig/L	3903 ug/L	3970 ug/L	3886 ug/L	3930 ug/L	3930 ug/L	3930 ug/L	3930 ug/L
Compound Petrachloroethene Officine Prichloroethene Vinyl chloride Kylene (total) Hell 22 Dichloroethene cis-1,3-Dichloropropylene trans-1,2-Dichloropropone	£	0.50 U 0.50 U 26 1.0 U 0.50 U 2.1 0.50 U 0.50 U	25 U 25 U 1700 180 25 U 1400 25 U 1& J	12 U 240 12 U 23 U 640 12 U 12 U 12 U	0.11 J 5,0 300 93 J 7.2 210 0.50 U 16 0.50 U	0.50 U 9,17 J 800 30 0.31 J 420 0.50 U 9.0	0.50 U 0.59 0.50 U 1.0 U 0.50 U 0.50 U 0.50 U	0.50 U 0.50 U 1.0 U 0.50 U 0.50 U 0.50 U 0.50 U	0.50 U 0.50 U 1.6 U 0.50 U 0.50 U 0.50 U 0.50 U
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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1) Volatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-6 N5503 11/17/99 3970 ug/L	MW-6A N5294 11/16/99 3930 ug/L	MW-8 N5290 11/15/99 3930 ug/L	MW-8A N5291 11/15/99 3930 ug/L		
Compound							
1,1,1-Trichloroethane	,,	0.50 U	0.50 U	0.50 U	0.50 U		> 1970
L1.2.2-Tetrachloroethane		0.50 U	0.50 U	0.50 TJ	0.50 U	• "	
1,1,2-Trichloroethane		0.50 U	0.50 U	0.50 U	0.50 U		7555 77853
L1-Dichlaroethane		0.50 U	0.96	0.50 U	0.50 U		*47.580.0 208
1,1-Dichloroethene		13	4.3	0.50 U	0.50 U		: samasa
12-Dichleroethane		ir.	0.50 U	0.50 U	0.50 U	·· •	
1,2-Dichloropropane		0.50 U	0.50 U	0.50 U	0. 50 U		
2-Butanone (MEK)		1011	10 U	10 U	10 U		
2-Hexanone		5.0 U	5.0 U	5.0 U	5.0 U		
4-Methyl-2-pentanone (MIBK)	50 U	5.0 U	5.0 U	5.0 U		
Acetone	*	10 U	10 U	10 U	10 U	· .	· 434 *********
Benzene		25	30	0,50 U	0,50 U	t ·	
Bromodichloromethane		0.50 U	0.50 U	0.50 U	0.50 U	**************************************	2000
Bromoform	···	0.50 U	0.5010	0.50 U	0.50 U		
Bromomethane		1.0 U	1.0 U	1.0 U	1.0 U		··
Carbon distilfide		0.50 U	0.5013	0.50 U	0.50 U	·	
Carbon tetrachloride		0.50 U	0.50 U	0.50 U	0.50 U		2018 (1918 S
Chlorobenzene		40	60	0.50 U	0.50 U		
Chloroethane		8.0 J	11	1.0 U	1.0 U		1 . 10 % 5.00
Chloroform		0.50 U	0,50 U	0.50 U	0.50 U		
Chloromethane		1.0 U	1.0 U	1.0 U	1.0 U		1.000.000.000.000.000.000
Dibromochloromethane		0.50 U	0.50 U	0.50 U	0.50 U		
Ethylbenzene		10	0.11 J	0.50 U	0.50 U		to the state of th
Methylene chloride	•••	2.010	2.0 U	2.0 U	2.0 U		
Styrene	•	0.50 U	0.50 U	0.50 U	0.50 U		

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Volatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-6 N5503 11/17/99 3970 ug/L	MW-6A N5294 11/16/99 3930 ug/L	MW-8 N5290 11/15/99 3930 ug/L	MW-8A N5291 11/15/99 3930 ug/L		
Compound					0.5011		
Tetrachloroethene		0.50 U	0.50 U	0.50 U 0.50 U	0.50 U 0.50 U		
Tolliene Prichloroethene		9,8 53 J	1.6 30	0.50 U	0.50 U		
Zinyi chloride		710	480	1.01	1,0 U		
(ylene (total)		1.3	1.1	0.50 U	0.50 U		: 2 1/2 03.000
is-1,2-Dichleroethene		3900	1200	0.50 TJ	0.50 U	•	
:is-1,3-Dichloropropylene		0.50 U	0.50 U	0.50 U	0.50 U	·	
rans-1.2-Dichloroethens	:	66.1	16	0.50 U	0.50 U		. (27 48)/////////
trans-1,3-Dichloropropene		0.50 U	0.50 U	0.50 U	0.50 0		
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Sample I Lab ID Sample I SDG ID Units	D Date		
Compound			- 2 C.3.26 **
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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-1 N6920 12/17/99 4237 ug/L 148 ft.	ECJ-1 N6921RE 12/17/99 4237 ug/L 267 ft.	ECJ-1 N6918 12/18/99 4237 ug/L 122 ft.	ECJ-1 N6916 12/18/99 4237 ug/L 62 ft.	ECJ-1 N6917 12/18/99 4237 ug/L 72 ft.	ECJ-1 N6915 12/19/99 4237 ug/L 37 ft.	ECJ-2 N7526 01/03/00 4345 ug/L 117 ft.	ECJ-2 N7528 01/03/00 4345 ug/L 47 ft.
Compound									
1,2,4-Trichlorobenzene		65	11 U	3.1 J	74	90	12	11 U	11 U
1.2-Dichlerobenzene		6.73	. IIV	5.9 I	7.2. J	10.3	10 U	uu	HD W
1,3-Dichlorobenzene		24 J	11 UJ	18 J	21 J	17 J	6.0 J	11 U	11 U
I 4-Dichlarobenzene		7.43	5.9.J	50	12	9.83	12	11 U	32 1 () / / / / / / /
2,2'-oxybis(1-Chloropropane)		11 UJ .	11 U	10 UJ	11 UJ	11 U J	10 UJ	11 U	11 U
2.4.5-Trichlorophenol		56 U	55 U	52 UJ	55 U	54 Ü	52 U	.53 U	53 U 11 U
2,4,6-Trichlorophenoi	•	11 U	11 U	10 UJ	11 U	11 U	iou	11 U	
2.4-Dichierophenol		nu,	110	10 UX	11 U	ĦŬ.	10 U	11 U	itv
2,4-Dimethylphenol		11 U	11 U	10 UJ	11 U	11 U	10 U	3.9 J	11 U
2.4-Dinitrophonol		36 U	55 1 3	52 U#	SS U	54 U	52 U	R	R
2,4-Dinitrotoluene		11 U	11 U	10 U	11 U	11 U	10 U	11 U	11 Ü
2.6-Dinitrotoluene		nu ·	1ĮŲ	10 U	11 Ų	110	10 U	11 Ų	nv.
2-Chloronaphthalene		11 U	11 U	10 U	11 U	11 U	10 U	11 U	11 U
2-Chlorophenol		IJΨ	. 110	EU 01	11 U	1 1 U	10 U	11 Ų	110
2-Methylnaphthalene		11 U	11 U	10 U	11 U	11 U	10 U	11 U	11 U
2-Methylphenol		H D	nu	2.2.3	11 V	ИU	10 U	4,9 1	uv
2-Nitroaniline		56 U	55 U	52 U	55 U	54 U	52 U	53 U	53 Ù
2-Niirophenol		II V	nu	10 VI	11 V	HU.	10 U	11 U	HÜ (MA)
3,3-Dichlorobenzidine		22 U	22 U	21 U	22 U	22 U	21 U	21 UJ	21 U
J-Niroaniline		56 U		52 U	5 5 U	54 U	52.0	\$3 Ü	53.U
4,6-Dinitro-2-methylphenol		56 U	55 U	52 UJ	55 U	54 U	52 U	53 UJ	53 UJ
4-Bromophenyl phenyl ether		11.0	nu	TO T	11 D	110	100	11.0	0.00
4-Chloro-3-methylphenol		11 U	11 U	10 UJ	11 U	11 U	10 U	11 U	11 U
4-Chloroaniline	,		110	10 U	11 U	ដេម	10 U	11 U	nu.s.
4-Chlorophenyl phenyl ether		11 U	11 U	10 U	11 U	11 U	10 U	11 U	11 U

NOTES:

U - not detected, J - estimated, R - unusable.

Page 1 of 5



Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-1 N6920 12/17/99 4237 ug/L 148 ft.	ECJ-1 N6921RE 12/17/99 4237 ug/L 267 ft.	ECJ-1 N6918 12/18/99 4237 ug/L 122 ft.	ECJ-1 N6916 12/18/99 4237 ug/L 62 ft.	ECJ-1 N6917 12/18/99 4237 ug/L 72 ft.	ECJ-1 N6915 12/19/99 4237 ug/L 37 ft.	ECJ-2 N7526 01/03/00 4345 ug/L 117 ft.	ECJ-2 N7528 01/03/00 4345 ug/L 47 ft.
Compound							10.11	1177	11 U
4-Methylphenol		11 U	11 U	10 UJ	11 U	11 U	10 U	11 U	
4-Nitroantline		56 U	55 U	52 U	55 U	54 Ŭ	52 U	53 U	53 U
4-Nitrophenol		56 U	55 U	52 UJ	55 U	54 U	52 U	53 UJ	53 UJ
Acenaphthene		nu .	11 0	10 U	11.U	HÜ	10 U	11.0	40/32
Acenaphthylene		11 U ·	บับ	10 U	11 U	11 U	10 U	11 U	11 U
Anthracene		nu	110	ЮU	n u	II Ü	10 U	11 U	nu see
Benzo(a)anthracene		11 U	11 U	10 U	11 U	11 U	10 U	11 UJ	11 U
Benzo[s]pyrene		ii u	110	10 U	nu	1 1 U	10 U	11.U	HO CONTRACT
Benzo(b)fluoranthene		11 U	ii U	10 U	11 U	11 U	10 U	II U	11 U
Benzo(ghi)perylene		11 U	111	10 U	ΙιΨ	11 U	10 U	11 U	H. W.
Benzo(k)fluoranthene		11 U	11 U	10 U	11 U	11 U	10 U	11 U	11 U
Butyi benzyl phthalate		11 V	11 11	10 U	11 U	HU	iou	11 W	uv 🧷 🦓
Carbazole		11 U	11 U	10 U	11 U	11 U	10 U	11 U	11 U
		no no.	, 11 U	io Ų	11 U	1117	10 U	11 U J	nu%%%
Chrysene Di-n-butyl phthalate		11 U	11 U	10 U	11 U	11 U	10 U	11 U	11 Ü
		no i	iiu	voi	11 V	IIU	10'11	11 UI	nv
Disn-octyl phthalate		11 U	11 U	10 U	11 U	11 U	10 U	11 U	11 UJ
Dibenzo(a,h)anthracene			iiu	TOU TOU	11 V	110	: · 1010	11 U	11 U // // //
Dibenzofuran		II W		2.7 J	11 U	3.7 J	10 U	11 U	11 U
Diethyl phthalate		11 U	11 U		11 U	11 U	10 U	1 E U	ii u
Dimethyl phthalate	•	11 V	11.0	10 tř		11 U	10 U	11 U	ווט
Fluoranthene		11 U	11 U	10 U	11 U		10 U	11 U	ne di
Fluorene		11 V	11.0	, to U	11 0	11 U			**************************************
Hexachlorobenzene		11 U	11 U	10 U	11 U	11 U	10 U	11 U	
Hexacidorobuudlene		11 111	11 U I	io tij	11 UJ	11 UI	10 N1	11 U	H.U
Hexachlorocyclopentadiene		11 U	11 U	10 U	11 U	11 U	10 U	11 U	11 U

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-1 N6920 12/17/99 4237 ug/L 148 ft.	ECJ-1 N6921RE 12/17/99 4237 ug/L 267 ft.	ECJ-1 N6918 12/18/99 4237 ug/L 122 ft.	ECJ-1 N6916 12/18/99 4237 ug/L 62 ft.	ECJ-1 N6917 12/18/99 4237 ug/L 72 ft.	ECJ-1 N6915 12/19/99 4237 ug/L 37 ft.	ECJ-2 N7526 01/03/00 4345 ug/L 117 ft.	ECJ-2 N7528 01/03/00 4345 ug/L 47 ft.
Compound						11.77	10 U	ווט	11 U
Hexachloroethane		11 U	11 U	10 U	11 U	11 U 1 1 U		11 U	ii Walio
Indeno(1,2,3-cd)pyrene	•	n v	i i i	1011	11 U	6.9 J	10 U	11 U	11 U
Isophorone		11 U	11 U	3.6 J	11 U	6.9 J	100	11 U	110 5-77
N-Nitrosodipropylamine		n v	11 U	lou	11 U	11 U	6.1 J	11 U	11 U
N-Nitrosodiphenylamine		11 U	11 U	10 U	3,8J	15	10 U	11.0	ny (4.28)
Naphihaiene		631	11 0	15	رو _ي و 11 U	11 U	10 U	11 U	11 U
Nitrobenzene		11 U	11 U	10 U 52 U#	55 U	54 U	52 U	53 U	531) (જે છે જે
Pentachiorophenol		***	. \$\$·U		33 U 11 U	11 U	10 U	11 U	11 U
Phenanthrene		11 U	11 U	10 U 10 UI	11 U	11 0	10 U	11 U	nvar in
Phenal		11 U	11 U	10 U	11 U	11 U	10 U	11 UJ	11 U
Pyrene		11 U	11 U	10 U	11 U	110	ЮU	11 V	niis (ag
Bis(2-chiloroethoxy)methane		11 Ų	11 0	10 U	11 U	11 U	10 U	11 U	11 U
Bis(2-chloroethyl)ether		11 U 11 V	11 U 11 U	10 U	11 U	110	· 10·U	11 U J	11.10
Bis(2-sthylhexyl)phthalate (BEI	nry	11.0	114	100	110	***	+		. 7. 7. 7.823
			•.•				•		Colore Carlotte
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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-2 N7527 01/03/00 4345 ug/L 82 ft.	ECJ-2 N6951 12/19/99 4249 ug/L 187 ft.	ECJ-2 N6952 12/20/99 4249 ug/L 152 ft.	ECJ-4 N7532 01/04/00 4345 ug/L 132 ft.	ECJ-4 N7531RE 01/04/00 4345 ug/L 162 ft.	ECJ-4 N7530 01/04/00 4345 ug/L 227 ft.	ECJ-4 N7529 01/04/00 4345 ug/L 245 ft.	ECJ-4 N7607 01/05/00 4357 ug/L 62 ft.
Compound					10 U	11 U	11 U	11 U	10 U
1,2,4-Trichlorobenzene		11 U	10 U	12 U		11 U	- nu	11.0	1013
L2-Dichlarobenzene		nu.	10 U	120	10 U	11 U	11 U	11 U	10 U
1,3-Dichlorobenzene		2.2 J	10 U	12 U	10 U	11 Ŭ	ûv	11 U	100
L4-Dichlerobenzene		2.2 J	10 U	12 U	10 ii		11 U	11 U	10 U
2,2'-oxybis(1-Chloropropane)		11 U	10 UJ	12 UJ	10 U	11 U	53 U	53 U	90
2.4.3-Trichiarophenai		53 Ü	.520	60 U	\$1 U	Ř	33 U 11 U	11 U	10 U
2,4,6-Trichlorophenol		11 U	10 U	12 U	10 U	11 U	-11 U	11 U	1011
2,4-Dichiorophenol		11 U	10 U	12 U	10 U	HU	•	11 U	10 U
2,4-Dimethylphenol		11 U	10 U	12 U	10 U	11 U	11 U R	R	
2,4-Dinitrophenol		R	52 U	60 U	R	53 U		11 U	\$218
2,4-Dinitrotoluene		11 U	10 U	12 U	10 U	11 U	11 U		10 U
2.6-Digitrotoluene		11 U	10 U	12 U	10 U	11 0	nu	. 11 U	10 U
2-Chloronaphthalene		11 U	10 U	12 U	10 U	11 U	11 U	11 U	10 U
2-Chlorophenol		HÜ.	. 10 U	12 U	10 U	HU	ii V	11 U	. v////www.cos///cose/
2-Methylnaphthalene		11 U	. 10 U	12 U	10 U	11 U	11 U	11 U	10 U
2-Methylphenol		11,0	2.63	12 U	10 U	uu	üv	11 A	iou
2-Nitroaniline		53 U	52 U	60 U	51 U	53 U	53 U	53 U	52 U
2-Nitrophenol		n v	1011	12 U	10 U	uv	HU	11 A	1011
3.3-Dichlorobenzidine		21 U	21 U	24 U	20 U	21 U	21 U	21 U	21 U
3-Nitroaniline		53 U	52 U	60 Ŭ	51 V	53 U	\$3 U	\$3 U	52 U
4,6-Dinitro-2-methylphenol		53 UJ	52 U ·	60 U	51 UJ	53 UJ	53 UJ	53 UJ	52 U
4-Bromophenyl phenyl ether		11.0	1011	t2 Ü	10 U	uu	110	11 0	iou
		11 U	10 U	12 U	10 U	11 U	i1 ប	11 U	10 U
4-Chloro-3-methylphenol				12 tJ	10 Û	11 U	11.0	11 U	ion
4-Chloroaniline 4-Chlorophenyl phenyl ether	•••	11 U	10 U	12 U	10 U	11 U	ຳເບ	11 U	10 U

NOTES:

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic	Compound Data
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	Sample ID Lab ID Sample Date SDG ID Units	ECJ-2 N7527 01/03/00 4345 ug/L 82 ft.	ECJ-2 N6951 12/19/99 4249 ug/L 187 ft.	ECJ-2 N6952 12/20/99 4249 ug/L 152 ft.	ECJ-4 N7532 01/04/00 4345 ug/L 132 ft.	ECJ-4 N7531RE 01/04/00 4345 ug/L 162 ft.	ECJ-4 N7530 01/04/00 4345 ug/L 227 ft.	ECJ-4 N7529 01/04/00 4345 ug/L 245 ft.	ECJ-4 N7607 01/05/00 4357 ug/L 62 ft.
Compound							1177	11 U	10 U
4-Methylphenol		11 U	10 U	12 U	10 U	3.5 J	11 U		
4-Nitroaniline		53 U	52 U	60 U	51 U	53 U	53 U	53 U	52.U
4-Nitrophenol		53 UJ	52 U	60 U	51 UJ	53 UJ	53 UJ	53 UJ	52 U
Acenaphthene		លបំ	10 U	12U	10 U	II Ų	uv	nu	1010
Acenaphthylene		11 U .	10 U	12 U	10 U	11 U	11 U 	11 U	10 U
Anthracene		nu .	10 U	12 U	10 U	II U	nu	uu	10.10
Benzo(a)anthracene		11 U	10 U	12 U	10 U	11 U	11 U	11 U	10 U
Benzo alpyrene		nu	10 U	12U	10 U	li Ŭ	nw	11 U)	1019
Benzo(b)fluoranthene		11 U	10 U	12 U	10 U	11 U	11 UJ	11 UJ	10 U
Benzo(ghi)perylene		11 W	10 U	12 U	10-UI	ПU	nu	11 U F	100
Benzo(k)fluoranthene		11 U	10 Ü	12 U	10 U	11 U	11 UJ	11 UJ	10 U
Butyl benzyl phthalate		11.0	100	12 U	10 U	11 U	11 U	11 U	10 U
Carbazole		11 U	10 U	12 U	ιου	11 U	11 U	11 U	10 U
Chrysens		ijΨ	. 10 U	12 U	10 Ų	II W	nu	11 U	10,0
Di-n-butyl phthalate		11 U	10 U	12 U	10 U	11 U	11 U	11 U	10 U
Disn-octyl phthalate		11 Q	iou	12 U	10 U	HU	11 U	11 T	(OU)
Dibenzo(a,h)anthracene	•	11 UJ	10 U	12 U	10 UJ	11 U	11 UJ	11 UJ	10 U
Dibenzoluran		iin.	10 U	120	10 U	11 0	110	11 U	iou
3838666666		11 U	10 U	12 U	10 U	11 U	11 U	11 U	10 U
Diethyl phthalate			10 U	12 U	10 D	11 U	110	11.0	ioti 🦠
Dimethyl phthalate		11 U			10 U	11 U	11 U	11 U	10 U
Fluoranthene		11 U	10 U	12 U	10 U	11 U	110	11 U	ioù 💥 💥
Finorene	•	110	100	12 U		11 U	11 U	11 U	10 U
Hexachlorobenzene		11 U	10 U	12 U	10 U		11 Û	11 U	
Hexachlorobutadiene	, "	110	10 U	1213	10 Ü	11 U			10 U
Hexachlorocyclopentadiene		11 U	10 U	12 U	10 U	11 U	11 U	11 U	100

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-2 N7527 01/03/00 4345 ug/L 82 ft.	ECJ-2 N6951 12/19/99 4249 ug/L 187 ft.	ECJ-2 N6952 12/20/99 4249 ug/L 152 ft.	ECJ-4 N7532 01/04/00 4345 ug/L 132 ft.	ECJ-4 N7531RE 01/04/00 4345 ug/L 162 ft.	ECJ-4 N7530 01/04/00 4345 ug/L 227 ft.	ECJ-4 N7529 01/04/00 4345 ug/L 245 ft.	ECJ-4 N7607 01/05/00 4357 ug/L 62 ft.
Compound									
Hexachloroethane		11 U	10 U	12 U	10 U	11 U	11 U	11 U	10 U
Indeno(1,23-ed)pyrene		n w	10 Ú	120	10 UJ	HU	uw	មេឃ	INTERNATION
Isophorone		11 U	10 U	12 U	10 U	11 U	11 U	11 U	10 U
N-Nitrosodipropylamine		เบ็น	10 U	12U	10 U	IIU	uu	រប្រ	10.11
N-Nitrosodiphenylamine		11 U .	10 U	12 U	10 U	11 U	ιϊ υ	11 U	10 U
Naphthalene		nu de la company	iov	12 U	10 U	11 U	nu	110	100
Nitrobenzene		11 U	iou	12 U	10 U	11 U	11 U	11 U	10 U
Pentachiorophenol		53 U	52 U	60 U	\$1.U	53 U	53 U	53 U	52U
Phenanthrene		11 U	10 U	12 U	า้ง บ	11 U	រែប	11 U	10 U
Phenol		ilu	1 0 U	12 U	10 U	I i U	пŧ	11 U	ាច់ម ្នំ 🖓
Pyrene		11 U	10 U	12 U	10 U	11 U	11 U	11 U	10 U
Bis(2-chlomethoxy)methane		HU	10 U	12 U	10 U	11 U	ΠŲ	11 U	IOU
Bis(2-chloroethyl)ether		11 U	10 U	12 U	10 U	11 U	11 U	11 U	10 U
Bis(2-sthylhescyl)phthalate (BE	HP)	nv .	10 U	12 U	10 U	IIU	II U	មេ	iou 🦠

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-4 N7606 01/05/00 4357 ug/L 87 ft.	GCA-1 N5441RE 11/18/99 3958 ug/L	MW-12 N5440 11/18/99 3958 ug/L	MW-13 N5502 11/17/99 3970 ug/L	MW-13A N5501 11/17/99 3970 ug/L	MW-14 N5159 11/12/99 3903 ug/L	MW-15 N5065 11/10/99 3886 ug/L	MW-16 N5063 11/11/99 3886 ug/L
Compound							1071	11 71	11 U
1,2,4-Trichlorobenzene		10 U	4.1 J	10 U	10 U	10 U	10 U	11 U	11.00
2-Dichlarobenzene		10 U	3.71	10 U	10 ft	10 Ŭ	10 U	11 U	66 8/4 1, 2011, \$4,550m, 4.0
1,3-Dichlorobenzene		10 U	12 J	10 UJ	10 U	10 U	4.8 J	11 U	11 U
L4-Dichlorobenzene	•	10 U	36	5.9 J	10 U	10 Ü	17	11 U	11.0
2,2'-oxybis(1-Chloropropane)		10 U .	11 U	10 U	10 U	10 U	10 U	11 U	11 U
2.4.3-Trichlorophenol		si u	53 TJ	SI U	51 U	52 Ŭ	\$2.U	53 U	53 U
2,4,6-Trichlorophenol		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
2.4-Dichiorophenol		10 U	11.0	10 U	10 U	10 U	W	uu	Hu
2,4-Dimethylphenol		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
2.4-Dinitrophenol	•	51 U	· · 53 U	51 U	51 U	52 U	52 U	53 U	53.0
2,4-Dinitrotoluene		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
2.6-Dinitrotoluene		10 U	1 1 U	10 Ų	10 U	10 U	iou	11 U	ii u
2-Chloronaphthalene		10 U	29	8.6 J	10 U	10 U	10 U	11 U	11 U
2-Chlorophenol		10 U	11:U	10 U	10 U	10 U	10 Ü	11 U	ii.O
2-Methylnaphthalene		10 U	15	10 U	10 U	10 U	10 U	11 U	11 U
2-Methylphenol		1010	แบ	10°U	10 U	100	, 10 U	11 U	HU
2-Nitroaniline		51 U	53 U	51 U	51 U	52 U	52 U	53 U	53 U
2-Nibrophenol		10 U	11 U	10 U	10 U	1013	100	. 1FU	nv
3.3-Dichlorobenzidine		20 U	21 U	21 U	20 U	21 U	21 U	21 U	21 U
3-Nitroaniline		51 D	53 U	SI Ü	SI 🖰	52 U	\$2 U	53 U	53 U
4,6-Dinitro-2-methylphenol		51 U	. 53 U	51 U	51 U	52 U	52 U	53 U	53 U
4-Bromophenyl phenyl ether		10 D	11.0	10 U	10 U	10 U	10 0	11.0	110
4-Chloro-3-methylphenol		10 U	11 U	10 U	10 U	10 U	10 U	11 U	เเ็บ
• •		100	1ÎV	10 (7	10 U	10 Ü	10 U	11 U	4110 250 3
4-Chloroanilins 4-Chlorophenyl phenyl ether		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-4 N7606 01/05/00 4357 ug/L 87 ft.	GCA-1 N5441RE 11/18/99 3958 ug/L	MW-12 N5440 11/18/99 3958 ug/L	MW-13 N5502 11/17/99 3970 ug/L	MW-13A N5501 11/17/99 3970 ug/L	MW-14 N5159 11/12/99 3903 ug/L	MW-15 N5065 11/10/99 3886 ug/L	MW-16 N5063 11/11/99 3886 ug/L
Compound									44.77
4-Methylphenol		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
4-Nitroaniline		आंध	53 U	51 U	51 U	52 U	52 U	53 U	59.0 (2.0)
4-Nitrophenol		51 U	53 U	51 U	51 U	52 U	52 U	53 U	53 U
Acenaphthene		10 Ù	3.9.1	3.1.1	10 U	¥01	2,8 J	uv	no de de
Acenaphthylene		10 U .	11 U	10 U	10 U	10 U	10 U	11 U	11 U
Anthracene		10U	11 0	ЮU	10 U	10 U	10 U	110	uv .
Benzo(a)anthracene		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
Benzofajpyrena		10 U	1FUJ	10 U	10 U	10 U	10 U	មេ	np ;
Benzo(b)fluoranthene		10 U	ñ w	10 U	10 U	10 U	10 U	11 U	11 U
Benzo(ghi)perylene		iòti	11 UJ	10 U#	10 U	10 U	10 W	11 U J	าเพ
Benzo(k)fluoranthene		10 U	11 UJ	10 U	10 U	10 U	10 U	11 U	11 U
Butyl benzyl phthalate	•	ЮU	1fU	10 U	10 Ų	100	10 U	11 Ų	110
Carbazole		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
Chrysene		10 U	11 U	10 ¥	10 U	1013	10 U	11 U	HU 💸 🗀
Di-n-butyl phthalate		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
Di-n-octyl phthalate		10 U	11-U	10 U	10 U	101	10 U	11.0	nv 💨
Dibenzo(a,h)anthracene		10 U	11 UJ	10 UJ	10 U	10 U	10 U	11 UJ	າເພິ່
Dibenzofuran		10.0	nu	10 U	10 U	1013	10 U	11 U	HO: TA
Diethyl phthalate		10 U	11 U	10 U	10 U	10 U	10 U	11 U	າເບົ
		100	nu	10°U	10 U	ЮU	10 Ü	11 U	nu/
Dimetryl phthalate Fluoranthene	•	10 U	11 U	10 U	10 U	10 U	10 U .	11 U	11 U
******************		10'D'	110	10 U	10 U	10 U	10 U	110	iia 💥
Fluorene		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
Hexachlorobenzene			11 UI	10 U	1010	10 U	1010	11 U	HA (C. S.
Hexachiorobutadiene	•	100		10 U	10 U	10 U	10 U	11 U	**************************************
Hexachlorocyclopentadiene		10 U	11 U	10.0	10 0	10.0	100		

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-4 N7606 01/05/00 4357 ug/L 87 ft.	GCA-1 N5441RE 11/18/99 3958 ug/L	MW-12 N5440 11/18/99 3958 ug/L	MW-13 N5502 11/17/99 3970 ug/L	MW-13A N5501 11/17/99 3970 ug/L	MW-14 N5159 11/12/99 3903 ug/L	MW-15 N5065 11/10/99 3886 ug/L	MW-16 N5063 11/11/99 .3886 ug/L
Compound						10.77	10 U	11 U	11 U
Hexachloroethane		10 U	11 U	10 U	10 U 10 U	10 U 10 U	10 fü	11 U	
Indeno(1,2,3-cd)pyrene		10 U	1# \# 11 U	1 0 U) 10 U	10 U	10 U	10 U	11 U	### / 11 U
Isophorone N-Nitrosodipropylamine		10 ft	U U	10 U	10 U	10 U	10 U	11.U	11 1 1 (2) (3)
N-Nitrosodiphenylamine		10 U	38	10 U	10 U	10 U	10 U	8.8 J	11 U
Naphinsiene		10,0. ·	100	4.5.1	10-U	10 Ü	40	11 U	ary for the
Nitrobenzene		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 Ü
Pentachiorophenol			·· 53 Ü	51 U	51 U	52 U	52 U	53 U	sau (Tail)
Phenanthrene		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
Phenol		10Ü	5.7 F	3:71	19 fl	10 U	27	11 U	11.0
Рутепе		10 U	11 U	10 U	10 U	10 U	10 U	11 U	เมีย
Bis(2-chloroethoxy)methane		10 U	11 U	10 U	10 U	1013	10 Ú	11 U	HU
Bis(2-chloroethyl)ether		10 U	11 U	10 U	10 U	10 U	10 U	11 U	11 U
Bis(2-ethylhexyl)phthalate (E	EHP)	íoù"	11 U	10 Ų	10 U	10 U	ΙÓŪ	11 U	HU
		•					·		
			: .* .						
	· ·		· · ·				$(0,1) = \partial (x_1, x_2, x_3, x_4, x_4, x_4, x_4, x_4, x_4, x_4, x_4$		
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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-17 N5442RE 11/18/99 3958 ug/L	MW-2 N5161 11/12/99 3903 ug/L	MW-22A N5500DL 11/17/99 3970 ug/L	MW-24 N5064 11/11/99 3886 ug/L	MW-4 N5288 11/15/99 3930 ug/L	MW-4A N5289 11/15/99 3930 ug/L	MW-5 N5292 11/16/99 3930 ug/L	MW-5A N5293 11/16/99 3930 ug/L
Compound						1011	10 U	10 U	11 U
,2,4-Trichlorobenzene		10 U	53	11 U	10 U	10 U		10 U	**
2-Dichlarobenzene		10 U	2.6.1	IIV	10 U	10 Ŭ	10 U	10 U	11 Ü
1,3-Dichlorobenzene		10 UJ	20	4.3 J	3.2 J	10 U	10 U		********
L4-Dichlarobenzene		10 Ú	\$ 9	12	11	10 U	. 10 U	10 U	******\^;;;<*;< 11 U
2,2'-oxybis(1-Chloropropane)		10 U .	10 U	63	10 U	10 U	10 U	10 U	
245-Trichiorophenol		52 U	51 U	53 U	52 U	\$Q Ü	្នុងរៈម	50 U	59 U
2,4,6-Trichlorophenol		10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 Ü
2,4-Dichiorophenol		10 U	100	нv	10 U	10 U	10 U	10 U	HIN NAME
2,4-Dimethylphenol		10 U	10 U	140	10 U	10 U	10 U	10 U	11 U
2.4-Dinitrophenol		52 U	51 W	53 U	52 U	50 U	\$1 U	50 U	ទាប 🔆
2,4-Dinitrotoluene		10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U
2,6-Dicitrotoluene		iou	· 10U	HU	10 U	1013	10 U	10 U	# # #3000
2-Chloronaphthalene		10 U	10 U	270	10 U	10 U	10 U	10 U	11 U
2-Chlorophenol		10 U	10 U	II U	10 U	10 U	10·U	10 U	HV S
2-Methylnaphthalene		10 U	10 U	100	10 U	10 U	10 U	10 U	11 U
		100	10 U	36	· 10·U	10U	10 U	10 U	,其果 ,未然
2-Methylphenol		52 U	51 U	53 U	52 U	50 U	51 U	50 U	53 U
2-Nitroaniline			10 U	ijΨ	10 U	101	iou	10 V	n u
2-Nitrophenol		10 U		21 U	21 U	20 U	20 U	20 U	21 U
3,3-Dichlorobenzidine		21 U	20 U		52.U	50 U	51 D	50 U	siu 🖂 🗸
3-Nitroaniline		52 U	51 U	53 U		50 U	51 U	50 U	53 U
4,6-Dinitro-2-methylphenol		52 U	51 U	53 U	52 U	10 U	10 U	10 U	nu A
4-Bromophenyl phenyl ether		10 U	10 U	ĦŪ	10 Ü		10 U	10 U	11 U
4-Chloro-3-methylphenol		10 U	10 U	11 U	10 U	10 U		10 U	
4-Chloroanilins		10 U	10 U	ΙΙÜ	10 Đ	10 U	10 D		11 U
4-Chlorophenyl phenyl ether		10 U	10 U	11 U	10 U	10 U	10 U	10 U	110

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-17 N5442RE 11/18/99 3958 ug/L	MW-2 N5161 11/12/99 3903 ug/L	MW-22A N5500DL 11/17/99 3970 ug/L	MW-24 N5064 11/11/99 3886 ug/L	MW-4 N5288 11/15/99 3930 ug/L	MW-4A N5289 11/15/99 3930 ug/L	MW-5 N5292 11/16/99 3930 ug/L	MW-5A N5293 11/16/99 3930 ug/L
Compound									
4-Methylphenol		10 U	10 U	140	10 U	10 U	10 U	10 U	11 U
4-Nitroaniline		52 U	51 U	53 U	52 U	50 Ŭ	51 U	50 U	3319
4-Nitrophenol		52 U	51 U	53 U	52 U	50 U	51 U	50 U	53 U
Acenaphthene		10 U	19 U	16	10 U	10 U		10 U	HV SACE
Acenaphthylene		10 U	10 U	3.1 J	10 U	10 U	10 U	10 U	11 U
Anthracene		10 U	10 U	2.1 3	10 U	10 U	10 U	រេប	nv ode
Benzo(a)anthracene		10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U
Benzo[s]pyrene		10 U	100	11 UI	10 U	10 U	10 U	10 U	un Ting
Benzo(b)fluoranthene		10 U	10 U	11 UJ	10 U	10 U	10 U	10 U	11 U
Benzo(ghi)perylene		wi	10 UJ	11 UI	19 tu	10 UJ	10 U	10 U	nn 🦠
Benzo(k)fluoranthene		10 Ü	10 U	11 UJ	10 U	10 U	10 U	10 U	11 U
Butyf benzyl phthalate		10 U	1010	НŲ	10 U	10 U	10 U	10 U	HŲ 🦠
Carbazole		10 U	10 U	8.6 J	10 U	10 U	10 U	10 U	11 U
Chrysene		10 U	10 U	ИU	10 U	1013	10·U	10 U	na Sala
Di-n-butyl phthalate		10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U
Din-octyl phthalate		10 U	10 U	HÜ	10 U	10 U	10 U	10 Ų	HU
Dibenzo(a,h)anthracene		10 UJ	10 UJ	11 UJ	10 UJ	10 U	10 U	10 U	11 U
Dibenzofuran		100	10-11	ΗÜ	10 U	10 U	10 U	10 U	HT OF 🛷
Diethyl phthalate		10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U
		10.0	10 U	II Ü	10 U	10 U	10 D	10 U	uu 👑 🎉
Dimethyl phthalate Fluoranthene	,	10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U
			10 U	5.5 J	10 D	10 U	1010	10 U	n¢Ki 📆
Finorene Hexachlorobenzene		10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U
				HU	10 U		100	10 U	HU Section
Herachloroputadiene Hexachlorocyclopentadiene	. •	10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-17 N5442RE 11/18/99 3958 ug/L	MW-2 N5161 11/12/99 3903 ug/L	MW-22A N5500DL 11/17/99 3970 ug/L	MW-24 N5064 11/11/99 3886 ug/L	MW-4 N5288 11/15/99 3930 ug/L	MW-4A N5289 11/15/99 3930 ug/L	MW-5 N5292 11/16/99 3930 ug/L	MW-5A N5293 11/16/99 3930 ug/L
Compound									
Hexachloroethane		10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U
Indeno(1,2,3-cd)pyrene		ióm	10 UI	HW	10 UJ	10 (F)	10 m	10 UJ	nm: 🔅 🗴 🖔
sophorone		10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U
4-Nitrosodipropylamine		10 U	10 U	nv	10 U	10 U	10 U	10·U	nv ,
N-Nitrosodiphenylamine		10 U	10 U	11 U	4.7 J	10 U	10 U	10 U	11 U
Naphthalene	. ^ 	10 U	100%	1200	3.0 J	to U	· :.	10 U	11.0
Nitrobenzene		10 U	10 U	11 U	10 U	10 U	10 U	10 U	11 U
Pentischiorophenoi		52 U ×	51 U	53 U	52 U	50 Ŭ	siu	, 50 U	53.0
Phenanthrene		10 U	10 U	4.7 J	10 U	10 U	10 U	10 U	11 U
Zuenol		ion	10 U	200	45	10 U	10 U	10 U	nu // 🍇
Ругспе		10 Ü	10 U	11 U	10 U	10 U	.10 U	10 U	11 U
Bis(2-chloroethoxy)methane	•	10 U	10 U	HŲ	10 U	1013	10 U	10 U	uv
Bis(2-chloroethyl)ether		10 U	10 U	26	10 U	10 U	10 U	10 U	11 U
Bis(2-ethylhexyl)phthalate (B	EHP)	15	10 Ų	нu	10 U	10 U	10 U	10 U	11,6 (4,1)
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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

Semivolatile	Organic	Compound	Data
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	Sample ID Lab ID Sample Date SDG ID Units	MW-6 N5503 11/17/99 3970 ug/L	MW-6A N5294 11/16/99 3930 ug/L	MW-8 N5290 11/15/99 3930 ug/L	MW-8A N5291 11/15/99 3930 ug/L		
Compound							
1,2,4-Trichlorobenzene		10 U	11 U	10 U	10 U		مرز کی از این از این از این از این از این از این از این از این از این از این از این از این از این از این از ای
1.2-Dichlarobenzene		10,U	13 V	ЮU	10 ti		e Gais
1,3-Dichlorobenzene		10 U	11 U	10 U	10 U		80. v (4
L4-Dichiorobenzene		5.63	4.63	100	10 ft		
2,2'-oxybis(1-Chloropropane)		10 U ·	11 U	10 U	10 U		W.& V.1.890
2,4,5-Trichiarophenal		វា ប	53 U	. 50U	आ ध		
2,4,6-Trichlorophenoi		10 Ü	11 U	10 U	10 U		
2,4-Dichlorophenol	•	10 U	110	10U	10 U		
2,4-Dimethylphenol		10 U	11 U	10 U	10 U		.3000000
2,4-Dinitrophenol		si U	53 t)	50 U	51 U		
2,4-Dinitrotoluene		10 U	11 U	10 U	10 U		5.6.4.0.26.686
2,6-Dinitrotoluene		10 U	1110	10Ų	10 U	•	
2-Chloronaphthalene		10 U	11 U	10 U	10 U		C . (Co./1000C000000
2-Chiorophenol	•	IOU	1 1 U	10 U	10-U	· .	
2-Methylnaphthalene		10 U	11 U	10 U	10 U		100000
2-Methylphenol		10 U	, nv	vov	10 U		74.79
2-Nitroaniline		51 U	53 U	50 U	51 U		the stage
2-Nitrophenol		10 U	· uu	VOL	10 U		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
3,3-Dichlorobenzidine		20 U	21 U	20 U	21 U		to a see to
3-Nitroaniline		51 U	.53 U	50 U	5 1 U		
4,6-Dinitro-2-methylphenol		51 U	53 U	50 U	51 U		y A 30
4-Bromophenyl phenyl ether		10 U	nv	10 Ü	10 U		Signer of the second
4-Chloro-3-methylphenol		10 U	11 U	10 U	10 U		.
4-Chioroaniline		10 U	นบ	វេលប	10 U		
4-Chlorophenyl phenyl ether		10 U	າເປັ	10 U	10 U		

NOTES:

U - not detected, J - estimated, R - unusable.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic Compound Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-6 N5503 11/17/99 3970 ug/L	MW-6A N5294 11/16/99 3930 ug/L	MW-8 N5290 11/15/99 3930 ug/L	MW-8A N5291 11/15/99 3930 ug/L	
Compound						
4-Methylphenol		10 U	11 U	10 U	10 U	
4-Nitroaniline		รเบ	53 U	50 U	51 U	
4-Nitrophenol		51 Ù	53 U	50 U	51 U	
Acenaphthens		10 Ú	110	10 U	10 U	
Acenaphthylene		10 U .	11 U	10 U	10 U	151
Anthracene	•	iou .	11.0	10 U	10 U	
Benzo(a)anthracene		10 U	11 U	10 U	10 U	
Benzo[s]pyrene		10 U	11 U	101	10 U	
Benzo(b)fluoranthene		10 U	11 U	10 U	10 U	5 1.2 5000
Benzo(gin)perylene		10 U	1 1 U	10 U	19 U	
Benzo(k)fluoranthene		10 U	11 U	10 U	10 U	
Butyi benzyi phihalate	•	10 U	11 U	10 Ų	10 U	
Carbazole		10 U	11 U	10 U	10 U	
Chrysene		10 U	11.0	10 U	10 U	
Di-n-butyi phthalate		10 U	11 U	10 U	10 U	
Di-n-octyl phthalate		10 U.	. 110	10.U	10 U	
Dibenzo(a,h)anthracene		10 U	11 U	10 U	10 U	
Dibenzofuran		101)	iru	tou	10 U	
Diethyl phthalate		10 U	11 U	10 U	10 U	
Dimethyl phthalate		10 D	11 U	10 U	10 U	and the second s
Fluoranthene		10 U	11 U	10 U	10 U	
Finorene		10 U	uu	10 U	10 U	
Hexachlorobenzene		10 U	11 U	10 U	10 U	
Hexacitiombutadiene	•	10 U	1.1 U	10 U	10 U	7 W 1 W
Hexachlorocyclopentadiene		10 U	11 U	10 U	10 U	

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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Semivolatile Organic Compound Data

Le Se SI	ample ID ab ID ample Date DG ID nits	MW-6 N5503 11/17/99 3970 ug/L	MW-6A N5294 11/16/99 3930 ug/L	MW-8 N5290 11/15/99 3930 ug/L	MW-8A N5291 11/15/99 3930 ug/L	
Compound						
Hexachloroethane		10 U	11 U	10 U	10 U	
Indeno(1,2,3-cd)pyrene		10 N	11 01	to uj	10 U	
Isophorone		10 U	11 U	10 U	10 U	· .: >:
N-Nitrosodipropylamine		10 Û	11 U	10 U	10 U	
N-Nitrosodiphenylamine		10 U .	11 U	10 U	10 U	7. 55. 6
Naphthalene		10 ft	11 V	10 ប	មេប	
Nitrobenzene		10 U	11 U	10 U	10 U	s a paragraph w
Pentachlorophenol		51.U		50 U	<i>5</i> 1 U	
Phenanthrene		10 U	ii U	10 U	10 U	· · 6/30 - 040.600
Pienol		10 U	itu	10 U	10 U	
Pyrene		10 U	11 U	10 U	10 U	. in 12 - 0.0000
Bis(2-chloroethoxy)methane		10 U	11.0	10 U	10·U	
Bis(2-chloroethyl)ether		10 U	11 U	10 U	ຳ0 ບ	
Bis(2-ethylhexyl)phthalate (BEHF	")	10U	11 0	10 Ų	10 U	
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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Metals Data

Compound	Sample ID Lab ID Sample Date SDG ID Units	ECJ-1 N6920 12/17/99 4237 mg/L 148 ft.	ECJ-1 N6921 12/17/99 4237 mg/L 267 ft.	ECJ-1 N6918 12/18/99 4237 mg/L 122 ft.	ECJ-1 N6916 12/18/99 4237 mg/L 62 ft.	ECJ-1 N6917 12/18/99 4237 mg/L 72 ft.	ECJ-1 N6915 12/19/99 4237 mg/L 37 ft.	ECJ-1 FF N6928 12/17/99 4237 mg/L 148 ft.	ECJ-1 FF N6929 12/17/99 4237 mg/L 267 ft.
Arsenic		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Barium		0.1 U	0.05 J	0.061	0,1	0,04 J	0,8	0.04 J	0.053 / 40/200
Cadmium		U 10.0	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Caronium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	ooi n 🦠 🖏
T		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
A. Fannescont		0.00021J	0.0002 U	0.0002 U	0,0002 U	0.0002 U	0.000213	0.0002 U	0.0002 U
Mercury Selenium		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Silver		0.01 U	0.01 U	0.01 LJ	0,01 U	0.01 U	0.01 U	0,01 U	0.01 TO 10.00

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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Metals Data

Compound	Sample ID Lab ID Sample Date SDG ID Units	ECJ-1 FF N6926 12/18/99 4237 mg/L 122 ft.	ECJ-1 FF N6924 12/18/99 4237 mg/L 62 ft.	ECJ-1 FF N6925 12/18/99 4237 mg/L 72 ft.	ECJ-1 FF N6923 12/19/99 4237 mg/L 37 ft.	ECJ-2 N7526 01/03/00 4345 mg/L 117 ft.	ECJ-2 N7528 01/03/00 4345 mg/L 47 ft.	ECJ-2 N7527 01/03/00 4345 mg/L 82 ft.	ECJ-2 N6951 12/19/99 4249 mg/L 187 ft.
Arsenic		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Barium		0.06.1	0.2	6.04 J	0.6	Ų 1,0	0,04 J	0.1 U	or in the
Cadmium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chromium		0.01 U	0.01 U	0.01 13	0,01 U	0.01 U	0.02 U	0.02 U	00i U
Lead		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.002 J	0.005 U	0.005 U
Mercary		0:0002 U	0:0002 U	0,0002 U	0,0002 U	0.0002 U	0.0002 TJ	0.0002 U	0.0002 U
Scienium		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Silver		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.0110

NOTES: U- not detected, J - estimated, R - unusable, FF - field filtered.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Metals Data

Compound	Sample ID Lab ID Sample Date SDG ID Units	ECJ-2 N6952 12/20/99 4249 mg/L 152 ft.	ECJ-2 FF N7534 01/03/00 4345 mg/L 117 ft.	ECJ-2 FF N7536 01/03/00 4345 mg/L 47 ft.	ECJ-2 FF N7535 01/03/00 4345 mg/L 82 ft.	ECJ-2 FF N6954 12/19/99 4249 mg/L 187 ft.	ECJ-2 FF N6955 12/20/99 4249 mg/L 152 ft.	ECJ-4 N7532 01/04/00 4345 mg/L 132 ft.	ECJ-4 N7531 01/04/00 4345 mg/L 162 ft.
Arsenic		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Barium		0.061	O.I U	0.041	0,1 U	0,1	0.063	0.1 U	0.110 m - 1110
Cadmium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chromium		0.01 U	0.01 U	0.01 U	0,01 U	0,01 U	0.01 U	0.01 U	ootu 🛒 🔠
Lead		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Mercary		0.00021	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0,0002 U	0.0002 U
Selenium		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Silver		U 10.0	0.01 U	0.01 13	0.01 U	0.01 U	0.01 U	0.01 U	0.01 0
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NOTES: U- not detected, J - estimated, R - unusable, FF - field filtered.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Metals Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-4 N7530 01/04/00 4345 mg/L 227 ft.	ECJ-4 N7529 01/04/00 4345 mg/L 245 ft.	ECJ-4 N7607 01/05/00 4357 mg/L 62 ft.	ECJ-4 N7606 01/05/00 4357 mg/L 87 ft.	ECJ-4 FF N7540 01/04/00 4345 mg/L 132 ft.	ECJ-4 FF N7539 01/04/00 4345 mg/L 162 ft.	ECJ-4 FF N7538 01/04/00 4345 mg/L 227 ft.	ECJ-4 FF N7537 01/04/00 4345 mg/L 245 ft.
Compound						0.00571	0.006 II	0.005 U	0.005 U
Arsenic		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		
Barium		0.1 U	0.1 U	0.1 U	0,1 U	0,1 ()	0.1 U	0.1 U	OLU ANT
Cadmium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
		0.01 U	0.01 U	0.0210	0,02 U	0.01 U	. 0.01 U	0.01 U	ootu
Chromium			0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Lead		0.005 U ·			0.0002 U	0.0002 U	0,0002 TJ	0.0002 U	0.000231
Mensiry		0.000213	0.0002 U	0.0002 U				0.005 U	0.005 U
Selenium		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U		
Silver		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0,01 U	o.ou v

 $\label{eq:NOTES: U-not detected, J-estimated, R-unusable, FF-field filtered.}$

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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)

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	Sample ID Lab ID Sample Date SDG ID Units	ECJ-4 FF N7611 01/05/00 4357 mg/L 62 ft.	ECJ-4 FF N7610 01/05/00 4357 mg/L 87 ft.	GCA-1 N5441 11/18/99 3958 mg/L	MW-12 N5440 11/18/99 3958 mg/L	MW-13 N5502 11/17/99 3970 mg/L	MW-13 (FF) N5504 11/17/99 3970 mg/L	MW-13A N5501 11/17/99 3970 mg/L	MW-14 N5159 11/12/99 3903 mg/L
Compound			0.005 11	0.006.11	0.005.11	0.005 U	0.005 U	0.005 U	0.005
Arsenic		0.005 U	0.005 U	0.005 U	0.005 U			0,5	180.0
Barium		0.1 U	0.1 U	2.1	1	0,5	0,5		1
Cadmium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Chromium		0.01 U	0,01 U	0.006-1	0,003 J	0.004 J	0,004 J	0.004 1	0.00SJ
		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Lead					0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.000213
Mercury		0.000213	0.0002 U	0.0002 U				0.005 U	0.005 U
Selenium		0.005 U	0.005 U	0.003 J	0.003 J	. 0.004 J	0.005 U		
Silver	•	0.01 U	0.01 U	0.01 TJ	0.01 U	0.01 U	0.01 U	0,01 U	oota (277.1920

NOTES: U- not detected, J - estimated, R - unusable, FF - field filtered.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Metals Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-15 N5065 11/10/99 3886 mg/L	MW-16 N5063 11/11/99 3886 mg/L	MW-17 N5442 11/18/99 3958 mg/L	MW-2 N5161 11/12/99 3903 mg/L	MW-2 (FF) N5163 11/12/99 3903 mg/L	MW-22A N5500 11/17/99 3970 mg/L	MW-24 N5064 11/11/99 3886 mg/L	MW-24 (FF) N5067 11/11/99 3886 mg/L
Compound							0.010	0.005 II	0.005 U
Arsenic		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.012	0.005 U	.4
Barium		0,1,	0.1	0.0\$1	0,02 J	0,02 J	0,6	0.4	03 / 🐴
Cadmium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
		0.003.1	0.002.1	0.01 U	0.004 ¥	0.004 J	. 0:006 I	0.004 J	0.004J
Chromium			0.001 J	0.005 U	0.005 U	0.005 U	0.001 J	0.005 U	0.005 U
Lead		0.005 U		•	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Mercury		0,0002 U	0.0002 U	0.0002 U			0.003 J	0.005 U	0.003 ປີ
Selenium		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U			* 44 *9
Silver		0.01 U	. 0.01 U	0.01 U	0.01 U	0.01 U	0,01 U	0,01 U	0.01.0

NOTES: U- not detected, J - estimated, R - unusable, FF - field filtered.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

Metals Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-4 N5288 11/15/99 3930 mg/L	MW-4 (FF) N5297 11/15/99 3930 mg/L	MW-4A N5289 11/15/99 3930 mg/L	MW-4A (FF) N5298 11/15/99 3930 mg/L	MW-5 N5292 11/16/99 3930 mg/L	MW-5A N5293 11/16/99 3930 mg/L	MW-5A (FF) N5301 11/16/99 3930 mg/L	MW-6 N5503 11/17/99 3970 mg/L
Compound								0.005 11	0.005 U
Arsenic		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	
Barium		0.1	1.0	0.07 J	0,07 J	0.07 J	0.2	0.2	0.033
Cadmium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
		0.0021	0.01 U	0.004 J	0.002 I	0.004 J	0.003 I	0.001 J	0.004.1
Chromium		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Lead				0.0002 U	0.0002 U	0.0002 U	0.000213	0.0002 U	0.0002 U
Mercury		0.00021	0.0002 U			0.005 U	0.005 U	0.005 U	0.005 U
Selenium		0.002 J	0.005 U	0.005 U	0.005 U				0.01 W
Silver		0.01 U	0:01 Ü	0,01 Ü	0.01 U	0.01 U	0.01 U	0,01 U	ANT B

NOTES: U- not detected, J - estimated, R - unusable, FF - field filtered.

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Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1)
Metals Data

	Sample ID Lab ID Sample Date SDG ID Units	MW-6 (FF) N5505 11/17/99 3970 mg/L	MW-6A N5294 11/16/99 3930 mg/L	MW-8 N5290 11/15/99 3930 mg/L	MW-8 (FF) N5299 11/15/99 3930 mg/L	MW-8A N5291 11/15/99 3930 mg/L	MW-8A (FF) N5300 11/15/99 3930 mg/L	
Compound								
Arsenic		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	
Barium		0.03.3	0.06 J	0.021	0,01 J	0,03 J	0.03.1	
Cadmium		0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	
Chromium		0.003 J	0:003 J	0.01	0.003 J	0,006 J	0.0041	
Lead		0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	
Mercury		0.000213	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	
Selenium		0.002 J	0.005 U	0.005	0.005 U	0.005 U	0.005 U	~
Silver		0.01 U	0.01 U	0.0005 J	0.01 U	0.01 U	0.01 U	

 $\label{eq:NOTES:U-not detected, J-estimated, R-unusable, FF-field filtered.}$

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DBF File: FXP File:

Sample ID Lab ID Sample Date SDG ID Units	
Compound	
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D Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1) PCB Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-1 N6920 12/17/99 4237 ug/L 148 ft.	ECJ-1 N6921 12/17/99 4237 ug/L 267 ft.	ECJ-1 N6918 12/18/99 4237 ug/L 122 ft.	ECJ-1 N6916 12/18/99 4237 ug/L 62 ft.	ECJ-1 N6917 12/18/99 4237 ug/L 72 ft.	ECJ-1 N6915 12/19/99 4237 ug/L 37 ft.	ECJ-2 N7526 01/03/00 4345 ug/L 117 ft.	ECJ-2 N7528 01/03/00 4345 ug/L 47 ft.
Compound					0.56411	0.67111	0.53 U	0.52 U	0.57 U
Aroclor 1016		0.53 U	0.53 U	0.58 U	0.56 UJ	0.57 UJ			
Aroclot 1221		0,53 U	0.53 U	0.5810	0.56 UJ	0,57 VI	0.53 U	0.52 U	433.6
× 7× × × × × × × × × × × × × × × × × ×		0.53 U	0.53 U	0.58 U	0.56 UJ	0.57 UJ	0.53 U	0.52 U	0.57 U
Aroclor 1232					0.52 J*	0,57 UI	1,1*	0.52 U	0370
Arocior 1242		0,44 3*	0.53 U	0.5813					0.57 U
Aroclor 1248		0.53 U	0.53 U	0.58 U	0.56 UJ	0.57 UJ	0.53 U	0.52 U	
	•	0.53 Ū	0.53 U	0.58 TJ	0.56 U)	0.57 UJ	0.53 U	0.52 U	0.57 U
Arocior 1254 Arocior 1260		0.53 U	0.53 U	0.58 U	0.56 UJ	0.57 UJ	0.53 U	0.52 U	0.57 U
MINNINI 1200		-							. 7.5.28 6688

NOTES: U- not detected, J - estimated, R - unusable, * - Altered 1242 pattern.

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Di Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1) PCB Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-2 N7527 01/03/00 4345 ug/L 82 ft.	ECJ-2 N6951 12/19/99 4249 ug/L 187 ft.	ECJ-2 N6952 12/20/99 4249 ug/L 152 ft.	ECJ-4 N7532 01/04/00 4345 ug/L 132 ft.	ECJ-4 N7531 01/04/00 4345 ug/L 162 ft.	ECJ-4 N7530 01/04/00 4345 ug/L 227 ft.	ECJ-4 N7529 01/04/00 4345 ug/L 245 ft.	ECJ-4 N7607 01/05/00 4357 ug/L 62 ft.
Compound						0.5011	0.58 U	0.52 U	0.52 U
Aroclor 1016		0.51 U	0.53 U	0.58 U	0.53 U	0.58 U			
			0,53 Ŭ	0.58 U	0.53 U	0.58 U	0,58 U	0.52 TJ	0.52 U
Arocior 1221		0,51 U			0.53 U	0.58 U	0.58 U	0.52 U	0.52 U
Aroclor 1232		0.51 U	0.53 U	0.58 U				0.52 U	0.52U
		0.51 U	0,53 U	0.5810	0.53 U	0,\$8 U	0,58 U		• •
Arocior 1242			0.53 U	0.58 U	0.53 U	0.58 U	0.58 U	0.52 U	0.52 U
Aroclor 1248		0.51 U				0.58 U	0.58 U	0.52 U	0.520
Aroclor 1254		0.51 U	0.53 Ŭ	0.58 U	0.53 U				0.52 U
367,137,107,00° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° ° °		0.51 U	0.53 U	0.58 U	0.53 U	0.58 U	0.58 U	0.52 U	
Aroclor 1260		0.51 0							·

NOTES: U- not detected, J - estimated, R - unusable, * - Altered 1242 pattern.

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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1) PCB Data

	Sample ID Lab ID Sample Date SDG ID Units	ECJ-4 N7606 01/05/00 4357 ug/L 87 ft.	GCA-1 N5441 11/18/99 3958 ug/L	MW-12 N5440 11/18/99 3958 ug/L	MW-13 N5502 11/17/99 3970 ug/L	MW-13A N5501 11/17/99 3970 ug/L	MW-14 N5159 11/12/99 3903 ug/L	MW-15 N5065 11/10/99 3886 ug/L	MW-16 N5063 11/11/99 3886 ug/L
Compound		<u> </u>	2 (11	0.52 U	0.52 U	0.51 U	0.52 U	0.56 U	0.52 U
Aroclor 1016		0.51 U	2.6 U		0.52 U	0,51 U	0.52 U	0.56 U	0.52 U
Arocior 1221		0,51 U	2,6 U	0.52 U			0.52 U	0.56 U	0.52 U
Aroclor 1232		0.51 U	2.6 U	0.52 U	0.52 U	0.51 U		1,5*	0320
		0,51 U	14 *	0.27 J*	0,26 J*	0,31 J*	0,83.*		
Aroclor 1242			2.6 U	0.52 U	0 52 U	0.51 U	0.52 U	0.56 U	0.52 U
Arocior 1248		0.51 U		0.52 U	0.52 U	0.51 U	0.52 U	0.56 U	0.090 J
Aroclor 1254		0.51 U	2.6 U			0.51 U	0.52 U	0.56 U	0.52 U
Aroclor 1260		0.51 U	2.6 U	0.52 U	0.52 U	0.51 0	``		177 2023

NOTES: U- not detected, J - estimated, R - unusable, * - Altered 1242 pattern.

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Sullivan's Ledge Superfund Site Post-Construction Ground Water Monitoring Operable Unit One (OU-1)

PCB Data

				rc	D Data				
	Sample ID Lab ID Sample Date SDG ID Units	MW-17 N5442 11/18/99 3958 ug/L	MW-2 N5161 11/12/99 3903 ug/L	MW-22A N5500 11/17/99 3970 ug/L	MW-24 N5064 11/11/99 3886 ug/L	MW-4 N5288 11/15/99 3930 ug/L	MW-4A N5289 11/15/99 3930 ug/L	MW-5 N5292 11/16/99 3930 ug/L	MW-5A N5293 11/16/99 3930 ug/L
compound				2611	5.1 U	0.51 U	0.51 U	0.53 U	0.53 U
roctor 1016		0.53 U	2.5 U	2.6 U	5.1 U	0.51 U	0.51 U	0.53 U	0.53 U
rocior 1221		0,53 U	2.5 U	2.6U	5.1 U	0.51 U	0.51 U	0.53 U	0.53 U
roclor 1232		0.53 U	2.5 U	2.6 U	47 *	0,51 U	0.51 U	0.53 U	0.53 U
roclor 1242		0,53 U	17 *	22*	5.1 U	0.51 U	0.51 U	0.53 U	0.53 U
rocior 1248		0.53 U	2.5 U	2.6 U	5.1 U	0.51 U	0.51 U	0.53 U	0.53 W
trocior 1254		0.53 U	250	2.6U	5.1 U	0.51 U	0.51 U	0.53 U	0.53 U
Aroclor 1260		0.53 U	2.5 U	3.2	5.1 0		•		
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U- not detected, J - estimated, R - unusable, * - Altered 1242 pattern. NOTES:

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5509,005 File Number:



Sullivan's Ledge Superfund Site

Post-Construction Ground Water Monitoring

Operable Unit One (OU-1) **PCB Data**

	Sample ID Lab ID Sample Date SDG ID Units	MW-6 N5503 11/17/99 3970 ug/L	MW-6A N5294 11/16/99 3930 ug/L	MW-8 N5290 11/15/99 3930 ug/L	MW-8A N5291 11/15/99 3930 ug/L	
Compound			0.52.11	0.51 U	0.53 U	g
Aroclor 1016		0.50 U	0.53 U	0.51 U	0.53 U	
Aroclor 1221		0,50 U	9,53 ¥		0.53 U	. 4
Aroclor 1232		0.50 U	0.53 U	0.51 U	0,53 U	· • • • • • • • • • • • • • • • • • • •
Alociol 1252		0,50 U	0.53 U	0.51 U		
Aroclor 1242		0.50 U	0.53 U	0.51 U	0.53 U	
Aroclor 1248			0.12 3	0.51 U	0.53 U	· ·
Aroclor 1254		0.50 U		0.51 U	0.53 U	· 4
Aroclor 1254 Aroclor 1260		0.50 U	0.53 U	0.51		·1
						.A

U- not detected, J - estimated, R - unusable, * - Altered 1242 pattern. NOTES:

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Sample ID Lab ID Sample Date SDG ID Units	
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Report

Data Validation

Sullivan's Ledge Superfund Site New Bedford, MA

March 2000

Report

Data Validation

Sullivan's Ledge Superfund Site New Bedford, MA

Swiatoslav W. Kaczmar, Ph.D., C.I.H. Chief Scientist

March 2000



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1. Introduction	
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3. Data validation protocols	5
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4.4. Metal analyses	
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1. Introduction

Data validation was performed for the ground water samples collected from the Sullivan Ledge Site in New Bedford, Massachusetts. The samples collected between November 10, 1999 and January 5, 2000 by O'Brien & Gere Engineers, Inc. were validated for volatile and semivolatile organic compounds, polychlorinated biphenyls (PCBs) and metals in accordance with Section 3 of the Field Sampling Plan (FSP) and Quality Assurance Project Plan (QAPP) First Operable Unit (O'Brien & Gere Engineers, January 2000).

1.1. General considerations

Validation is a process of determining the suitability of a measurement system for providing useful analytical data. Although the term is frequently used in discussing analytical methods, it applies to all aspects of the process and especially to the samples, their measurement, and the actual data generated. Accordingly, this report outlines excursions from the applicable quality control outlined in the following documents:

- Field Sampling Plan (FSP) and Quality Assurance Project and Qualtiy Assurance Project Plan (QAPP) First Operable Unit, Sullivan's Ledge Site, New Bedford, Massachusetts (O'Brien & Gere, January 2000).
- Test Methods for Evaluating Solid Wastes: Physical and Chemical Methods, SW-846, Final Update III, (USEPA, December 1996).
- Region I USEPA-New England (NE) Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part II, Volatile/Semivolatile Data Validation Functional Guidelines (USEPA Region I, December 1996).
- USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluation of Organic Analyses (USEPA Region I, November 1988).
- USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluation of Inorganic Analyses (USEPA Region I, February 1989).

USEPA Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), 540/1-89/002 (USEPA, revised 1992).

The following sections of this document address distinct aspects of the validation process. Section 2 lists the analytical methodology employed in sample analysis. Section 3 lists the data quality assurance/quality control (QA/QC) protocols used to validate the sample data. Specific QA/QC excursions and qualifications performed on the sample data are discussed in Section 4. Data usability with respect to the intended purposes of the data is discussed in Section 5.

2. Analytical methods

Samples were analyzed by O'Brien & Gere Laboratories, Inc. for selected target compounds utilizing the USEPA methods presented in Test Methods for Evaluating Solid Waste (USEPA, December 1996) shown in Table 2.1.

Table 2.1 Analytical methods.		
Parameter	Analytical Method	
Volatile organic compounds (34 target)	8260B	
Semivolatile organic compounds (64 target)	8270C	
PCBs	8082	
Metals (7 target)	6010B	
Mercury	7470A	
Source: O'Brien & Gere Engineers, Inc.		

Analytical results for these analyses are presented in the text of this First Quarterly Ground Water Sampling Event Report. The letters found immediately to the right of individual sample results serve to qualify the sample data. When the data validation process identified more than one quality control deficiency, the qualifier added to the sample result represents the cumulative effect of the individual QC excursions. Consistent with the listed guidance document, the following qualifiers may be used during the data validation:

- U Indicates that the compound was analyzed for, but was not detected. The quantitation limit is presented and adjusted for dilution. This qualifier is also used when the quantitation limit is raised due to presence of blank contamination.
- Indicates that the detected sample result should be considered J approximate. This qualifier is used when the data validation process identifies a deficiency in the data generation process. Additionally, this qualifier is used when analytes or compounds are detected at concentrations above the method detection limit (MDL) but below the method reporting limit (MRL). Results below the MRL should be considered approximate since method accuracy and precision are not defined for these concentration levels.
- UJ Indicates that the detection limit for the analyte in this sample should be considered approximate. This qualifier is used when the data validation process identifies a deficiency in the data generation process.

R Indicates that the previously reported detection limits or sample result was rejected due to a major deficiency in the data generation procedure. The data should not be used for qualitative or quantitative purposes.

4

3. Data validation protocols

Quality control data were evaluated based on accuracy and precision criteria specified in Section 3.3 of the site specific FSP and QAPP. The following are method specific QA/QC parameters used in the validation of sample data generated for this investigation:

Volatile, semivolatile, and PCB analyses

- Holding times and sample preservation
- GC/MS tuning criteria (as applicable)
- Initial and continuing calibration
- Blank analysis
- Surrogate recovery
- Internal standard performance (as applicable)
- Matrix spike/matrix spike duplicate (MS/MSD) analysis
- Field duplicate analysis
- Laboratory control sample (LCS) analysis
- System performance
- Target compound identification, quantitation, and reporting limits
- Documentation completeness
- Overall data assessment

Metals analyses

- Holding times and sample preservation
- Initial and continuing calibration
- Interference check standard analysis
- Blank analysis
- MS/MSD analysis
- Laboratory duplicate analysis
- Serial dilution analysis
- Field duplicate analysis
- LCS analysis
- Verification of instrument parameters
- Analyte quantitation and reporting limits
- Documentation completeness
- Overall data assessment

In accordance with the QAPP, laboratory control limits were used to assess MS/MSD, LCS, surrogate, and laboratory duplicate data. Field duplicate data were assessed based requirements specified in the QAPP. Based on guidance provided in EPA Region I's validation guidelines (USEPA Region I, November 1988, February 1989, December 1996), analytical data were qualified in the following manner when laboratory control limits were not met:

- If percent recoveries were less than laboratory control limits but greater than ten percent, non-detected and detected results were approximated (UJ, J).
- If percent recoveries were greater than laboratory control limits detected results were approximated (J).
- If percent recoveries were less than ten percent, detected results were approximated (J) and non-detected results were rejected (R).
- If relative percent differences (RPDs) for MSDs and laboratory duplicates were outside of laboratory control limits, detected results greater than the MRL were approximated.
- If RPDs were >50% (>± MRL for results <5xMRL) for field duplicates, detected results greater than the MRL were approximated.

It should be noted that qualification of data for MS/MSD analyses was performed only when both MS and MSD percent recoveries were outside of laboratory control limits. Qualification of data was not performed if MS/MSD or surrogate recoveries were outside of laboratory control limits due to sample dilution. Additionally, for MS/MSD and field duplicate excursions for organic analyses, qualifications of data was limited for the unspike sample or the field duplicate pair unless otherwise stated.

4. Data quality evaluation

This section summarizes the QA/QC parameters which met validation criteria and describes qualifications performed on sample data when QA/QC criteria were not met. Samples that required qualification are identified in the following sections by the sample location documented on the field chain of custody record. Equipment and trip blank data were used to assess contamination that may have been introduced during field sampling and sample shipment and were not qualified with respect to QA/QC excursions.

Field chain of custody records were accurate and complete. Samples were collected from a total of thirty-six sampling points. Field duplicate (ten percent), MS/MSD (five percent), equipment blanks (EB) and trip blanks (TB) were collected at the frequency specified in Section 2.6.6 of the site specific FSP and QAPP. Table 4.1 is a summary of the field QC samples that were collected. Dedicated sampling equipment was used to collect the ground water samples with the exception of the Westbay wells. An equipment blank was collected from the Westbay sampling equipment as required.

Field Duplicate Ids MS/MSD ID Equipment Blanks Trip Blanks DUP1 = MW-14 MW-5A EB-1 (associated with TB 11/12/99 DUP2 = MW-5 ECJ-1 (37') the Westbay wells TB 11/13/99	Table 4.1 Field QC Sample Collection					
DUP3 = ECJ-1 (62ft) Interpretation of the property of the p	9 9 9 9					

Table Notes:

Trip blanks were identified by date received.

Source: O'Brien & Gere Engineers, Inc.

4.1. Volatile organic analyses

The following QA/QC parameters met validation criteria or did not result in qualification of data:

- Holding times and sample preservation
- GC/MS tuning criteria
- Initial calibration
- Surrogate recovery
- Internal standard performance
- Field duplicate analysis
- LCS analysis
- System performance
- Documentation completeness

Continuing calibration. Continuing calibration %D criterion (<25%) was exceeded. Table 4.2 is a summary of the data qualified. Laboratory corrective actions were not required since method specified requirements were met for system performance check compounds (SPCCs) and calibration check compounds (CCCs). It should be noted that for chloroethane, the sensitivity increased.

Analysis Date	Compound	%D	Action	Samples Affected
11/24/99 at 09:36	bromomethane	27.5	IJ	MW-16, MW-24, MW-15
11/30/99 at 09:41	chloroethane	26.1	UJ, J	MW-22A, MW-13A, MW-13, MW-6
12/2/99 at 08:44	chioroethane	32.4	IJ	MW-12, GCA-1, MW-17
12/22/99 08:37	chloroethane	33.3	UJ	ECJ-1(37'), ECJ-1(62'), ECJ-1(72'), ECJ-1(122'), ECJ-1(148'), DUP3
12/28/99 06:35	chloroethane	36.9	IJ	ECJ-1(267')
12/29/99 06:19	chloroethane	34.2	ÜJ	ECJ-2(187')
12/30/99 08:00 chloroethane 2-butanone	chloroethane	26.1	UJ	ECJ-2(152')
	2-butanone	36.8	UJ	
1/6/00 06:24	chloroethane	36.0	UJ	ECJ-2(117'), ECJ-2(82'), ECJ-2(47'), ECJ-4(245'), ECJ-4(227'), ECJ-4(87'), ECJ-4(62')
1/7/00 06:39	2-butanone	34.2	UJ	ECJ-4(162'), ECJ-4(132')
	2-hexanone	29.4	UJ	

MS/MSD analyses. Percent recoveries were below laboratory control limits for 2-butanone (47%, 49%) and 2-hexanone (53%, 56%) in MS/MSD sample MW-5A. Nondetected results for these compounds were qualified as approximate (UJ) in sample MW-5A. Laboratory corrective actions were not required since the associated LCS met criteria.

Blank analyses. Methylene chloride was detected in various trip blanks. Blank action levels were calculated at ten times the highest concentration detected. Detected results less than laboratory MRLs and the calculated blank action level were replaced with the MRL and qualified as nondetected (U). Detected results greater than laboratory MRLs but less than the calculated blank action level were qualified as nondetected (U). Table 4.3 is a summary of the data qualified.

Blank ID	Compound	Concentration (ug/L)	Action	Samples Affected
TB 11/12/99	Methylene chloride	0.5	Replaced result with MRL, U	MW-24
TB 11/17/99	Methylene chloride	0.37	Replaced result with MRL, U	MW-4, MW-4A, MW-8 MW-8A, MW-5A, DUP2
TB 11/19/99	Methylene chloride	0.98	Replaced result with MRL, U	MW-12, MW-17
TB 11/22/99	Methylene chloride	0.78	Replaced result with MRL, U	MW-13, MW-6

Table Notes: TB – trip blank

Source: O'Brien & Gere Engineers, Inc.

Target compound identification, quantitation, and reporting limits. Elevated reporting limits were reported for several ground water samples based on sample dilutions performed prior to analysis. Dilutions were performed by the laboratory based on historical data provided. In addition, several samples were analyzed undiluted and required dilution and reanalysis to obtain compounds within the linear calibration range. In several instances, when samples were diluted and reanalyzed at the appropriate dilution, some of the target compounds that were detected above the linear calibration range in the undiluted run, were diluted out. This was due to the high concentrations present for vinyl chloride and cis-1,2-dichloroethene. In these cases, results were reported from the undiluted run and qualified as approximate since results may be biased low. Table 4.4. is a summary of the samples and compounds that were impacted. Table 4.5 is a summary of the sample dilutions performed and compounds that were reported from the diluted runs.

Table 4.4 Q range	ualifiation of data: volatile compounds abo	ve the linear
Sample ID	Compounds detected >Linear Range	Action
MW-6	Trans-1,2-dichloroethene, trichloroethene	J
ECJ-1(62')	1,1-dichloroethene, benzene, toluene	J
ECJ-1(72')	Benzene	J
ECJ-1(122')	Benzene, 1,1-dichloroethene	J
Dup 3	1,1-dichloroethene, benzene, toluene	J
Source: O'Bri	en & Gere Engineers, Inc.	

Table 4.5 Vola	tile sample dilution				
Sample ID	Dilution Factor	Compounds Reported			
MW-24	100	Vinyl chloride, cis-1,2-dichloroethene, benzene, trichloroethene, chlorobenzene			
MW-14	50	All target compounds			
DUP1	50	All target compounds			
MW-2	50	All target compounds			
MW-4	25	All target compounds			
MW-6A	50	All target compounds			
MW-12	2	All target compounds			
GCA-1	100	All target compounds except cis-1,2-dichloroethene			
	500	cis-1,2-dichloroethene			
MW-22A	25	All target compounds			
MW-13	50	All target compounds			
MW-6	200	Vinyl chloride, cis-1,2-dichloroethene			
ECJ-1(37')	5	All target compounds except vinyl chloride and cis-1,2-			
, ,		dichloroethene			
	50	Vinyl chloride, cis-1,2-dichloroethene			
ECJ-1(62')	2000	Vinyl chloride, cis-1,2-dichloroethene, ethylbenzene (J), trans-1,2-dichloroethene (J)			
ECJ-1(72')	2000	Vinyl chloride, 1,1-dichloroethene (J), trans-1,2-dichloroethene (J), trichloroethene, toluene (J), ethylbenzene			
	5000	cis-1,2-dichloroethene			
ECJ-1(122')	2000	Vinyl chloride, trans-1,2-dichloroethene (J), cis-1,2-dichloroethene, toluene, ethylbenzene			
ECJ-1(148')	1000	Vinyl chloride, 1,1-dichloroethene (J), trans-1,2-dichloroethene (J), cis-1,2-dichloroethene, toluene (J), ethylbenzene			
DUP3	2000	Vinyl chloride, cis-1,2-dichloroethene, ethylbenzene (J), trans-1,2-dichloroethene (J)			
ECJ-1(267')	10	Ethylbenzene			
ECJ-2(187')	10	All target compound except vinyl chloride and cis-1,2-dichloroethene			
	100	Vinyl chloride, cis-1,2-dichloroethene			
ECJ-2(152')	10	All target compounds			
ECJ-2(117')	1000	All target compounds except cis-1,2-dichloroethene			
	2000	cis-1,2-dichloroethene			
ECJ-2(82')	250	All target compounds except vinyl chloride			
	1000	Vinyl chloride			
ECJ-2(47')	100	All target compounds			
=					

Table Notes:

Source: O'Brien & Gere Engineers, Inc.

Overall data assessment. Volatile analyses and QA/QC procedures were performed in accordance with analytical method and QAPP requirements. Volatile data are useable for qualitative and quantitative purposes. Detected and nondetected results were qualified as approximate (UJ or J) for several compounds and samples based on minor excursions from continuing calibration, MS/MSD recovery, and compound quantitation requirements. Detected results reported at concentrations less than laboratory MRLs were qualified as approximate (J).

⁽J): The reported result was qualified as approximate since the concentration reported from the diluted run was less than the laboratory MRL.

4.2. Semivolatile analyses

The following QA/QC parameters met criteria or did not result in qualfication of data:

- Holding times and sample preservation
- GC/MS tuning criteria
- Initial calibration
- Blank analysis
- MS/MSD analysis
- Field duplicate analysis
- System performance
- Target compound identification, quantitation, and reporting limits
- Documentation completeness

Continuing calibration. Continuing calibration %D criterion (<25%) was exceeded. Table 4.6. is a summary of the data qualified. Laboratory corrective actions were generally not required since method specified requirements were met for system performance check compounds (SPCCs) and calibration check compounds (CCCs). Laboratory corrective action was not performed as required when di-n-octylphthalate exceed method requirements for continuing calibrations performed on 11/21/99, 11/24/99, 1/13/00. The laboratory documented in the case narrative that corrective action was not required since sensitivity increased and this compound was not detected in samples associated with these calibrations.

Table 4.6 Qualification of semivolatile data: continuing calibration criteria				
Analysis Date	Compound	%D	Action	Samples Affected
11/21/99 09:04	Indeno(1,2,3- cd)pryene	38.7	W	MW-16, MW-24, MW-15, MW-2
	Dibenzo(a,h)anthracen	29.5	UJ	
•	Benzo(g,h,i)perylene	27.3	UJ	
11/22/99 13:52	Indeno(1,2,3 cd)pryene	37.0	UJ	MW-4, MW-14
	Benzo(g,h,i)perylene	30.4	UJ	
11/24/99 14:00	Indeno(1,2,3- cd)pryene	31.9	W	DUP1, MW-4A, MW-8, MW-8A, MW-5, MW-5A, MW-6A, DUP2

11/30/99 14:24	Indeno(1,2,3- cd)pryene	38.7	W	MW-12, GCA-1, MW-17
	Dibenzo(a,h)anthracen e	26.2	W	
	Benzo(g,h,i)perylene	26.9	UJ	
1/6/00 14:32	2,2'oxybis-(1- chloropropane)	37.1	W	ECJ-1(37'), ECJ-1(62'), ECJ-1(72'), ECJ-1(122'), DUP3, ECJ-1(148'), ECJ-2(187'), ECJ-2(152')
1/14/00 13:13	indeno(1,2,3-d)pyrene	26.2	ÜÜ	ECJ-2(82'), ECJ-2(47'), ECJ-4(245'), ECJ-
	Dibenzo(a,h)anthracen e	27.7	W	4(227'), EĈJ-4(132')
	Benzo(g,h,i)perylene	26.9	W	
1/19/00 08:24	2,4-dinitrophenol	28/2	UJ	ECJ-2(117'), ECJ-4(162')
	chyrsene	30.6	IJ	
Source: O'Brien 8	k Gere Engineers, Inc.			

Blank analysis. Bis(2-ethylhexyl)phthalate (BEHP) was detected in one of eight laboratory method blanks and in EB-1. Blank action levels were calculated at ten times the highest concentration detected. Detected results that were less than laboratory MRLs and the calculated blank action level were replaced with the MRL and qualified as nondetected (U). Detected results greater than laboratory MRLs but less than the calculated blank action level were qualified as nondetected (U). Table 4.7. is a summary of the data qualified.

Blank ID	Compound	Concentration (ug/L)	Action	Samples Affected
PB122099W 1 EB-1	BEHP	3.4 66	Replaced result with MRL, U	ECJ-1(37'), ECJ-1(62'), ECJ-1(72') ECJ-1(122'), DUP3, ECJ-1(148'), ECJ 1(267'), ECJ-2(187')
EB-1	BEHP	66	Replaced result with MRL, U	

Surrogate recovery. Surrogate recoveries were outside of laboratory control limits in eight samples. Qualification of data was required only if two surrogates were outside of control limits for a fraction or if any one surrogate had a recovery less than ten percent. Table 4.8 is a summary of the data qualified.

Sample ID	Surrogate	%Recovery	Action	Compounds Affected
ECJ-1(122')	2-fluorophenol phenol-d5	63 37	UJ, J	Phenol, 2-chlorophenol, 2-methylphenol, 4-methylphenol, 2-nitrophenol, 2,4-dimethylphenol, 2,4-dichlorophenol, 4-chloro-3-methylphenol, 2,4,6-trichlorophenol, 2,4,5-trichlorophenol, 2,4-dinitrophenol, 4-nitrophenol, 4,6-dinitro-2-methylphenol, pentachlorophenol

LCS analysis. Percent recoveries were not within laboratory control limits for three of the eight LCSs extracted. The affected LCSs were reanalyzed with similar results. Table 4.9. is a summary of the data qualified.

Table 4.9 Qua	lification of semivolatile o	lata: LCS recove	ery criteria.	•	
LCS ID	Compound	%Recoveries	Action	Samples Affected	
L112199W2	Hexachiorobutadiene	42, 43	W	MW-12, GCA-1, MW-17	
	1,3-dichlorobenzene	55, 55	UJ, J		
L122099W1	Hexachlorobutadiene	52, 52	UJ	ECJ-1(37'), ECJ-1(62'), ECJ-1(72'), ECJ-1(122'), DUP3,	
	1,3-dichlorobenzene	49, 49	UJ, J	ECJ-1(148'), ECJ-1(267')	
L010600W2	2,4-dinitrophenol	0,0	R	ECJ-2(117'), ECJ-2(82'), ECJ-2(47'),	
	4-nitrophenol	30, 35	UJ	ECJ-4(245'), ECJ-4(227'), ECJ-4(162'),	
	4,6-dinitro-2-	40, 34	UJ	ECJ-4(132')	
	methylphenol		İ		
Source: O'Brier	n & Gere Engineers, Inc.				

Internal standards. Internal standard area criteria were not met. The affected samples were reanalyzed. Semivolatile data were reported from the analysis which has the best internal standard performance. Correlation between two sets of data were good. Table 4.10. summarizes the data that were qualified.

Sample ID	Internal Standard	Area Percent	Action	Compounds Affected
GCA-1	Perylene-d12	37%	UJ	Benzo(b)fluoranthene, benzo(k)fluoroanthene
MW-22A	Perylene-d12	43%	UJ	benzo(a)pyrene,
ECJ-4(245')	Perylene-d12	45%	IJ	Indeno(1,2,3-cd)pyrene, dibenzo(a,h)anthracene,
ECJ-4(227')	Perylene-d12	32%	UJ	benzo(g,h,i)perylene
ECJ-2(117')	Chyrsene-d12	42%	W	Pyrene, butylbenzylphthalate, 3,3'-dichlorobenzidine, benzo(a)anthracene, chyrsene, BEHP, di-noctylphthtalate

Compound quantitation. Compound quantitation was performed in accordance with method requirements. Sample MW-22A required dilution and reanalysis to obtain target compounds within the linear calibration range. Phenol, 2-chloronaphthalene, and naphthalene were reported from the ten times dilution that was performed for MW-22A.

Overall data assessment. Overall semivolatile analyses and QA/QC procedures were performed in accordance with analytical method and QAPP requirements. The majority of semivolatile data are useable for qualitative and quantitative purposes. Nondetected results were rejected (R) for 2,4-dinitrophenol in seven samples based on LCS recoveries lesst than ten percent. Some semivolatile data were qualified as aproximate (UJ or J) for several compounds and samples based on minor excursions from continuing calibration, surrogate, LCS, and internal standard performance.

4.3. PCB analyses

The following QA/QC parameters met criteria or did not result in qualification of data:

- Holding times and sample preservation
- Initial and continuing calibration
- Blank analysis
- MS/MSD analysis
- Field duplicate analysis
- LCS analysis
- System performance
- Documentation completeness

Surrogate recovery. Surrogate recoveries were not within laboratory control limits in several instances. Qualification of data was performed only when both surrogates compounds did not meet recovery criteria or if any one surrogate had recovery less than ten percent. Table 4.11 is a summary of the data qualified.

Sample ID	Surrogate	%Recovery	Action
ECJ-1(37')	TCMX	39	UJ. J
	DCB	27	
ECJ-1(72')	TCMX	37	UJ
,	DCB	42	

TCMX- surrogate compound, tetrachloro-m-xylene DCB – surrogate compound, decacachlorobiphenyl

Source: O'Brien & Gere Engineers, Inc.

Target compound identification, quantitation, and reporting limits. The laboratory reported that PCB Aroclor 1242 detected in the samples exhibited an altered pattern. Based on review of the raw data, peaks were present within retention time windows established for Aroclor 1242 on both primary and confirmation columns utilized by the laboratory. The pattern did not match with respect to peak ratios for Aroclor 1242 or any other Aroclor. Aroclor 1242 was the closest match and correlation between calculated values from primary and confirmation columns were good. In addition, altered Aroclor 1242 patterns have been seen historically in soils and ground samples collected from the site. Therefore, data was not qualified.

Elevated reporting limits were reported for ground water samples MW-2, MW-24, GCA-1, and MW-22A. These samples were diluted to obtain target PCB concentrations within the linear calibration range.

Overall data assessment. PCB analyses and QA/QC procedures were performed in accordance with analytical method and QAPP requirements. PCB data are useable for qualitative and quantitative Detected and nondetected results were qualified as approximate in two samples based on excursions from surrogate recovery limits.

4.4. Metal analyses

The following QA/QC parameters met criteria or did not result in qualification of data:

- Holding times and sample preservation
- Initial and continuing calibration
- Interference check standard analysis
- MS/MSD analysis
- Laboratory duplicate analysis
- Serial dilution analysis
- Field duplicate analysis
- LCS analysis
- Verification of instrument parameters
- Analyte quantitation and reporting limits
- Documentation completeness

Blank analysis. Analytes were detected above method detection limits (MDLs) but below laboratory reporting limits in laboratory blanks. Detected results less than laboratory MRLs and the calculated blank action level were replaced with the MRL and qualified as nondetected (U). Detected results greater than laboratory MRLs but less than the calculated blank action level were qualified as nondetected (U). Table 4.12 is a summary of the data qualified. Laboratory corrective actions were not required since analytes were detected at concentrations less than laboratory MRLs.

Table 4.12 Qua Blank ID	Analyte	Concentration	Action	Samples Affected
		(mg/L)	7.5.15.1	
CCBs 11/23/99	cadmium	0.0008	Replace result with MRL, U	MW-16
CCBs 1/10/00	lead	0.0018	Replace result with MRL, U	ECJ-1(62'), DUP3, ECJ-1(122')-filtered ECJ-2(152'), DUP3-filtered, ECJ-2(187')-filtered
CCBs 1/20/00	cadmium	0.00061	Replace result with MRL, U	ECJ-2(82')
	selenium	0.0031	Replace result, with MRL, U	ECJ-4(132')



EB-1	barium	0.006	Replace result with MRL, U	ECJ-2(82'), ECJ-4(245'), ECJ-4(227'), ECJ-4(162'), ECJ-4(132'), ECJ-4(87'), ECJ-4(62'), ECJ-1(148'), ECJ-2(117')
	chromium	0.004	Replace result with MRL, U	
			U	ECJ-4(132'), ECJ-4(87'), ECJ-4(62'), ECJ-4(227'), ECJ-2(82'), ECJ-2(47'), DUP3
EB-1-filtered	barium	0.006	Replace result with MRL, U	ECJ-2(117')-filtered, ECJ-2(82')-filtered, ECJ-4(245')-filtered, ECJ-4(132')-filtered, ECJ-4(132')-filtered, ECJ-4(87')-filtered, ECJ-4(62')-filtered
	chromium	0.004	Replace result with MRL, U	ECJ-4(245')-filtered, ECJ-4(162')-filtered, ECJ-4(132')-filtered, ECJ-4(87')-filtered, ECJ-4(62')-filtered, ECJ-1(37')-filtered, ECJ-1(62')-filtered, ECJ-1(72')-filtered, ECJ-1(122')-filtered, ECJ-2(187')-filtered, ECJ-2(152')-filtered, ECJ-2(47')-filtered, DUP3-filtered

Overall data assessment. The laboratory performed metal analyses and QA/QC procedures in accordance with analytical method and QAPP requirements. Metals data are usable for qualitative and quantitative purposes. Detected results were qualified as nondetected for cadmium, selenium, barium, and chromium in several samples based on concentrations observed in laboratory and equipment blanks.

5. Data usability

Analytical data were validated for samples collected from the Sullivan Ledge Site in New Bedford, Massachusetts. Ground water samples were validated for volatile and semivolatile organic compounds, PCBs, and metals based on accuracy and precision criteria specified in the QAPP. When excursions were observed from QA/QC requirements, the analytical data were qualified based on guidance provided in the USEPA Region I validation guidelines (USEPA Region I, November 1988, February 1989, December 1996).

Rejected data resulted from a major excursion from QA/QC criteria and should not be used for either qualitative or quantitative purposes. Minor deficiencies in the data generation process resulted in approximation of sample data. Approximation of a data point indicates uncertainty in the reported concentration of the analyte, but not its assigned identity. The conservative assumptions used in the development of conclusions based on the analytical data verifies that approximated analytical data adheres to the project data quality objectives. This approach to the use of analytical data is consistent with the guidance presented in the USEPA Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), 540/1-89/002 (USEPA, December 1992).

This section summarizes the adherence of the analytical data to the data quality objectives (DQOs) established in the QAPP for precision, accuracy, representativeness, comparability, completeness, and sensitivity. A detailed discussion of the analytes and samples which were qualified is presented in Section 4. Summary tables of validated sample results with data validation qualifiers have been provided in Appendix D of this report.

Data quality objectives were evaluated using percent usability defined as the percentage of sample results that are usable for qualitative and quantitative purposes.

Precision was assessed from laboratory MSD and field duplicate analyses. Data usability with respect to precision was calculated as 100%. Precision requirements were met.

Accuracy was assessed from GC/MS tuning, calibration, surrogate recovery, internal standard performance MS/MSD, and LCS data. Data usability with respect to accuracy was calculated as 100% for volatile, PCB, and metals data and as 99% for semivolatile data. Nondetected

results were rejected for 2,4-dinitrophenol in the following seven samples based on LCS recoveries that were less than ten percent: ECJ-2(117'), ECJ-2(82'), ECJ-2(47'), ECJ-4(245'), ECJ-4(227'), ECJ-4(162'), and ECJ-4(132'). In addition, some volatile, PCB, and semivolatile data were qualified as approximate (UJ or J) based on minor excursions from QA/QC requirements.

Representativeness was assessed from holding times, sample preservation, blank analysis, target compound identification and quantitation, sampling and analytical methodologies used. Data usability with respect to representativeness was 100%. Detected results for methylene, BEHP, cadmium, lead, selenuim, barium, and chromium were qualified as nondetected (U) in several of the samples due to contamination observed in the associated laboratory and field blanks.

Comparability is a qualitative measure, therefore, usability calculations were not performed. Comparability requirements were met since standard analytical methods, reporting units, reference materials, and data deliverables were utilized by the laboratory.

Sensitivity requirements were met for metal analyses. Laboratory MRLs were elevated for volatile (15 samples), semivolatile (1 sample), and PCB (4 samples) based on the laboratory dilutions performed to obtain concentrations within the linear calibration range. Sample dilutions were performed in accordance with method requirements and were based on historical data.

Detected results reported at concentrations less than the MRL were approximated since method accuracy and precision data are not defined below the MRL.

Data completeness was calculated as 99%, exceeding the 95% requirement established in the QAPP.